DOCUMENT RESUME

ED 075 405 SP 006 371

AUTHOR	Drowatzky, John N., Ed.
TITLE	Abstracts of Research Papers 1970.
INSTITUTION	American Association for Health, Physical Education, and Recreation, Washington, D.C.
PUB DATE	70
NOTE	131p.; Papers presented at the convention of the American Association for Health, Physical Education, and Recreation, Seattle, Washington, 1970
AVAILABLE FROM	American Association for Health, Physical Education, and Recreation, 1201 16th St., N.W., Washington, D.C. 20036 ($1.00)
EDRS PRICE	MF-$0.65 HC Not Available from EDRS.
DESCRIPTORS	*Abstracts; *Educational Research; Environmental Education; *Health Education; Motor Development; Physical Development; *Physical Education; *Recreation; Research Methodology

ABSTRACT

This publication includes the abstracts of 199 research papers presented at the 1970 American Association for Health, Physical Education, and Recreation convention in Seattle, Washington. Abstracts from symposia on environmental quality education, obesity, motor development, research methods, and laboratory equipment are also included. Each abstract includes the time and date on which the paper was presented at the convention. The name and address of the author are also presented. An author index completes the volume. (BRB)

ED 075405

ABSTRACTS

of Research Papers 1970

Presented during the Seattle Convention of the American Association for Health, Physical Education, and Recreation

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$1.00

PREFACE

This edition of Abstracts represents another year that the American Association for Health, Physical Education and Recreation has published the abstracts of research papers presented at its annual convention. A new format for the abstracts was adopted this year to provide the authors with more space to communicate the summaries of their presentations. One hundred nineteen papers have been scheduled for the 1970 Seattle convention program and appear in this booklet. In addition, abstracts of three symposiums and of the research equipment and laboratory methods program are included.

To facilitate your ability to attend papers of interest, an attempt has been made to group papers by subject matter. Each paper has been numbered and this number appears both in the convention program booklet and in this publication. The time and date each paper will be presented are indicated in the lower left-hand corner of each page. The name and address of the author to whom inquiries for further information may be sent appears in the lower right-hand corner. An index of all authors is provided at the end of this volume.

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COMPARISON OF ISOMETRIC AND EXER-GENIE EXERCISES IN THE DEVELOPMENT OF STRENGTH. Lynn W. McCraw, The University of Texas.

The purpose of the study was to compare the Exer-Genie exercise method whereby the muscle is subjected to an isometric contraction followed by an isotonic contraction with the isometric method whereby the muscle contracts only isometrically. Subjects, consisting of 52 college men enrolled in required physical education, were divided into two groups with one using the Exer-Genie method and the other engaging in an isometric exercise program. In the Exer-Genie method subjects exerted an isometric contraction for 10 seconds followed by an isotonic contraction throughout the range of movement for the joint involved in the exercise. Those using isometric exercises did two 8-second contractions at the starting position of the Exer-Genie method with a 4-second rest between contractions. Thus a total of 20 seconds was required for a single execution in each method. Subjects engaged in four exercises involving muscle groups as follows: thigh and leg extensors, arm flexors and forearm extensors, arm extensors and forearm flexors, and trunk flexors. Three executions were performed on each of the four exercises, three days per week for eight weeks. An aircraft cable tensiometer was used to determine the strength of muscle groups involved in the two exercises for the arms and that for the trunk. The Dillon Dynamometer was used for the muscles involved in extending the thigh and leg. Tests were administered prior to and after the eight-week training. Data were analyzed by use of the *t* test with groups compared on the basis of pretest, posttest, and gains made during the training period. The results of this analysis are summarized as follows: (1) The two groups were considered to be equal in initial strength since the *t* ratios for all four tests were well below the .05 level of confidence; (2) Both groups improved markedly in strength during the training period with all *t* ratios being well above the .01 level; (3) The improvements of the two groups were practically identical with none of the differences between gains approaching significance at the .05 level.

April 3, 1970
10:45 a.m.

Lynn W. McCraw
The University of Texas
Austin, Texas

THE INFLUENCE OF DYNAMIC MUSCULAR FATIGUE AND RECOVERY ON STATIC STRENGTH. Milan Svoboda, University of California, Berkeley.

The purpose of the study was to examine the progressive effects of performing a continuous-movement, constant-force fatiguing task on the static strength of the muscles involved in the performance of the task. Also of interest was the pattern of recovery of static strength from any changes brought on by the fatiguing task. Sixty volunteer subjects from physical education classes completed both the experimental and control conditions. A balanced design was used. The experimental condition consisted of 8 minutes of fatiguing work on a Henry horizontal arm ergometer at an initial rate of 107 rpm with a friction load of 3.13 kg. Strength measurements were taken in two positions (inward and outward) that occurred in one revolution of the ergometer. Strength was measured before the start of work, at 2 minute intervals during work, and for 8 minutes of recovery. The control condition was identical to the experimental condition except that rest was substituted in the place of the ergometer work. During the exercise, in which there was a 33 percent decrement in work rate, outward strength decreased in proportion to the work decrement, dropping off 12.5 percent by the end of exercise. Over the 8 minute post-exercise period, no statistically significant recovery effect was seen. Inward strength showed no decrement during the exercise. The absence of a strength decrement in the inward muscles was suggested as being related to the situation where the force requirement for turning the ergometer crank was low with respect to the strength of the muscles. It was concluded that when the conditions are such that strength decrement is proportional to ergometer work drop-off, the relative strength decrement is far less than the work decrement. Such decrement is evidently characterized by a very slow recovery.

April 3, 1970

Milan Svoboda
Department of Physical Education
University of California, Berkeley

HIGH-RESISTANCE, LOW-REPETITION TRAINING AS A DETERMINER OF STRENGTH AND FATIGABILITY. G. Alan Stull and David H. Clarke, University of Maryland.

The principal purpose of this study was to determine whether high-intensity, low-repetition training alters resistance to fatigue. The subjects, 20 male, college freshmen and sophomores, trained 3 times weekly during a 6-week experimental period. During each training session, every subject performed 3 sets (10 repetitions per set) of preferred arm curls against resistances of 1/2 10-repetition maximum (10-RM), 3/4 10-RM, and 10-RM, respectively. Whenever a subject successfully completed 15 repetitions against his previous 10-RM, an additional 5 lbs. of resistance were added, and this new weight was then used as his 10-RM for subsequent training. Pre- and post-testing consisted of a series of maximal contractions performed every other second over a 5-min. period. Strength levels at different time periods of the testing session were determined by taking the mean magnitude of 3 successive contractions at 30-sec. intervals. The first of the 11 determinations was defined as initial strength and the last, final strength. The sum of the 11 measured values represented total work, and fatigable work was calculated by subtracting the final strength value from each of the 11 determinations and summing the differences. Results indicated that significant gains ($p=.05$) occurred in the parameters of initial strength, final strength and total work, but no change was observed in fatigable work. An exponential analysis of the fatigue curves revealed no appreciable alteration as a result of the training. It was concluded that the principal effects caused by the high-resistance, low-repetition training seemed to be increased levels of strength and absolute endurance.

April 3, 1970
11:15 a.m.

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RELATIVE MUSCULAR ENDURANCE CHANGES IN IPSILATERAL AND CONTRALATERAL ARMS AS A FUNCTION OF TRAINING.* Larry G. Shaver, University of South Alabama.

This study investigated the effects of an isotonic training program on relative muscular endurance at various levels of strength in the ipsilateral and contralateral arms. The 40 right-handed male subjects were divided randomly into experimental and control groups. The experimental group trained in right arm elbow flexion curls three times weekly for six weeks. Immediately before and after the six week training period, an endurance test was performed with each arm on four succeeding days on a modified arm-lever ergometer involving loading levels of 20 per cent, 25 per cent, 30 per cent, and 35 per cent of their maximum strength. The relative load for each trial was determined from the average of three strength trials for elbow flexion. Each subject exercised with predetermined load at a cadence of 30 repetitions per minute. The exercise was terminated when the subject fell behind the cadence by four beats or when he was unable to go through the full range of movement on two successive repetitions. A comparison of the pre- and post-test results indicated that significant strength gains as well as endurance gains were experienced by the experimental group in both arms at all treatment levels. The pattern of relative endurance was curvilinear, thus following the exponential law. Correlations between maximum strength gains and endurance gains of the exercised arm for the trained group revealed that no relationship existed, thus suggesting that relative loading techniques tended to compensate for individual differences in muscular strength.

*This study was supported in part by a grant from the University of South Alabama Research Committee.

April 3, 1970
11:30 a.m.

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THE INFLUENCE OF PHYSIOLOGICAL WARMUP ON VARIOUS STAGES OF HEAVY MAXIMAL EXERCISE. Stanley L. Bassin, California State Polytechnic College.

The study investigated which stages of heavy work performance are susceptible to the warmup effect resulting from preliminary exercise. Thirty-six male students were tested under an initial practice condition, and subsequently under three warmup conditions (1) control with ten minute rest, (2) ten minutes of light preliminary exercise at 375 kpm/min, and (3) ten minutes of heavy preliminary exercise at 550 kpm/min. One minute after each condition, a criterion task of seven minutes "all-out" exercise was performed on a friction type bicycle ergometer at an initial rate of 2504 kpm/min. The order of testing was systematically rotated in order to balance out practice or training effects. Performance of preliminary exercise did not result in any statistically significant change in the criterion task work output. The practice effect during the four days of performance (each separated by one week) was non-significant but a variance analysis indicated a significant change in the work/time profile. Among individual subjects, those with the high initial work rate in the criterion task tended to finish at a relatively low rate, and conversely -- the correlation ranged from .46 on the first day to .91 on the fourth. The results of the study lead to the following conclusions: (1) The preliminary warmup exercises of 375 and 550 kpm/min are ineffective in improving the criterion task work output. (2) Subjects who start the criterion task at a high work rate will tend to finish at a lower rate than those who start slower. This over-rides the tendency of individuals of high work capacity to start and finish at a high rate.

*This study was completed as a doctoral dissertation at the University of California, Berkeley, California, with F. M. Henry as the advisor.

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April 3, 1970
11:45 a.m.

EFFECTS OF SWIMMING AND/OR NOISE UPON THE INSTRUMENTAL RESPONSE RATE OF RATS. Richard L. DeSchriver, East Stroudsburg State College.

This study investigated the effects of different treatment combinations of forced swimming and/or noise upon the instrumental response rate of rats who were exposed to noise while being tested. Sixty, 75-day old, male Sprague-Dawley rats were randomly assigned to a control group and four treatment groups: 6 weeks swimming, 6 weeks swimming and noise, 3 weeks swimming and noise, and 3 weeks noise. The swimming treatment consisted of varying lengths of exercise with a 6 gr. weight attached to the tail; the noise treatment was a 90 db., intermittent white noise signal. A pre-treatment, 5-minute Skinner box test was administered. Two similar post-treatment tests, spaced 24 hours apart, were run under the condition of a 100 db., intermittent white noise signal. The number of bar-touches for each 1-minute interval and the total number of bar-touches for the 5-minute test were recorded. Between-group differences for the various pre- and post-treatment rate of bar-touching measures were statistically non-significant. The post-treatment means of the rate measures tended to favor the treatment groups. Within-group comparisons were generally statistically significant. The treatments of forced swimming and/or noise did not produce differential rates of bar-touchin under a noxious noise signal.

April 3, 1970
12:00 noon

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MATERNAL ATTITUDES OF OBESE CHILDREN. Charles B. Corbin, Texas A&M University.

Considerable research has been reported in the literature concerning parental attitudes and their relationship to child adjustment. Specifically, it has been speculated that child development may be more affected by attitude of the parent than by actual child rearing practices. Indeed, the domineering, over-protective, rigid, obsessive, and perfectionistic attitudes of mothers of schizophrenic children are suspected in the etiology of childhood schizophrenia. Of concern to this investigation were the child rearing attitudes of mothers of obese children. Perhaps the child rearing attitudes unique to mothers of obese children may be related to the etiology of childhood obesity. It was the purpose of this investigation to study the attitudes of mothers of obese children as compared to the attitudes of mothers of non-obese children. Forty-four mothers and their fourth grade children, 22 girls and 22 boys, served as subjects for this investigation. Mothers of children were administered the Parental Attitude Research Instrument to determine their child rearing attitudes on each of the instruments 23 scales. Triceps skinfold measures were taken to determine fatness levels of children. In addition, height, weight, and other selected measurements were made on each child. An analysis of variance was done to determine differences between attitudes of mothers of children of three levels of fatness. Correlation coefficients and multiple regression equations were calculated to determine the relationship between body fatness and maternal attitudes as well as to determine the extent to which body fatness of children could be predicted from maternal PARI scores. Results of the analysis of variance indicated that mothers of fat children were more likely to encourage verbalization and were more irritable than were mothers of non-obese children. Four parental attitude variables; encouraging verbalization, irritability, acceleration of development, and avoidance of communication (negative) yielded a significant multiple r (.605) with a significant r^2 (.366). It appears that certain maternal attitudes do relate to obese conditions in children.

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April 3, 1970
10:45 a.m.

EFFECTS OF WEIGHT REDUCTION BY MEANS OF EXERCISE OR FOOD RESTRICTION ON THE HEART. L. B. Oscai and J. O. Holloszy, Washington University.

Obese animals lost weight either by means of exercise alone or food restriction alone over 18 weeks. Their hearts were then compared with the hearts of a basline group sacrificed at the start of the study. The average heart weight of 1504 $\pm$ 71 mg. for the exercisers was slightly lower than the value of 1555 $\pm$ 20 mg. for the baseline animals. However, because of weight losses amounting to approximately 25% of their initial body weights, the exercisers had a significantly ($P < 0.001$) greater heart weight to body weight ratio (mg. heart weight per g body weight) 3.02 $\pm$ 0.12 vs. 2.28 $\pm$ 0.03. The food restricted animals who had their food intakes adjusted so as to result in a rate of weight loss comparable to that of the exercisers had smaller hearts, 1220 $\pm$ 26 mg, than either the baseline or exercising animals ($P < 0.001$). In spite of their significantly smaller hearts, the heart weight to body weight ratio of 2.46 $\pm$ 0.08 was also significantly ($P < 0.05$) greater than that of the baseline animals. The results obtained on the weight reducing groups provide evidence that (1) an increase in the ratio of heart weight to body weight is not synonymous with cardiac hypertrophy, (2) weight reduction by means of food restriction results in a significantly smaller heart, and (3) exercise, to a large extent, prevents the decrease in heart size associated with a negative caloric balance.

April 3, 1970
11:00 a.m.

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THE EFFECT OF A 6 MONTH PERIOD OF TRAINING, COMPETITION, AND DETRAINING ON THE ESTIMATED BODY COMPOSITION OF COLLEGE BASKETBALL PLAYERS. Bradley L. Rothermel, University of Illinois at Chicago Circle; Benjamin Louis, Pinckneyville, Illinois.

Purpose: The present investigation was conducted to ascertain the effect of a 6 month period of training, competition, and detraining on the estimated body composition of college basketball players. Procedure: The estimated body composition of 43 males, between the ages of 17 and 22 inclusively (21 of whom acted as experimental subjects and 22 who acted as control subjects), was determined in a manner described by A. W. Sloan[1] and J. Brozek[2] at regular 1 month intervals beginning on September 15, 1968 (T_1, beginning of training) and continuing to March 15, 1968 (T_7, termination of a 3 week detraining period following the completion of competition). (Training determinated and competition commenced mid-way between T_3 and T_4). The experimental subjects were volunteers from the 1968-69 University of Illinois at Champaign-Urbana varsity and freshmen basketball teams. (All squad members, 11 of whom were varsity and 10 of whom were freshmen, participated in the investigation). The control group was randomly selected from individuals who were freshmen through senior students at the same institution and who had indicated their willingness to cooperate in the investigation. The control group was utilized only to reflect changes which may have occurred as a result of environmental conditions, and no attempt was made to determine between group differences on the variable under investigation. A test-retest reliability coefficient was computed for the variable under investigation. Means and standard deviations were computed, and the differences among the means of the experimental and control groups from T_1 to T_7 were subjected to statistical analysis by employing the one-way analysis of variance test. Differences were considered to be significant at the .01 level. Conclusion: Based on the results of this investigation, the following conclusion appeared justifiable: 1. No significant change in estimated body composition of college basketball players resulted as an effect of a 6 month period of training, competition, and detraining.

1. Sloan, A. W., "Estimation of Body Fat in Young Men," Journal of Applied Physiology, 23:311 - 315, 1967.

2. Brozek, J. et al., "Densitometric Analysis of Body Composition: Revisions of Some Quantitative Assumptions," Annals of the New York Academy of Sciences., 110:113 - 140, 1963.

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April 3, 1970
11:15 a.m.

THE UTILITY OF ANTHROPOMETRIC MEASURES IN DETERMINING IDEAL WEIGHT. David E. Cundiff, The University of Toledo.

There are numerous methods available to investigate ideal weight and/or body composition ranging in difficulty from simple insurance tables and nomograms to the complex procedures of underwater weighing and K^{40}. Apparatus and time involved are important considerations for the investigator who wants to compare various indices of body weight and composition to evaluate their usefulness in assessing ideal weight of adult men. The subjects were 104 men (executives and university personnel) ranging in age from 22 to 64 (mean age, 42.6). The body fat and weight analysis consisted of measuring height, actual weight (AW), body segment widths and girths for the Willoughby optimal weight (WOW) formula, and percent body fat (CBF) from three skinfold measures. Height and AW were used to obtain an overweight index (OWI above 110% considered overweight) and to estimate percent body fat (NBF) from a nomogram (Pierson and Eagle, Aerospace Medicine, 1969). Of the above indices, CBF was the criterion measure with optimal body fat considered to be between 13-15%. Product moment correlation coefficients were obtained on the data along with means and standard deviations. A t test was used to compare differences between means of AW with WOW and CBF with NBF. The comparison of means showed a significant difference ($p<.01$) between the percent body fat estimations (CBF=17.5, NBF=15.6), but no difference between the AW (180 lbs.) and WOW (178 lbs.). For practical purposes, OWI and CBF compared on each individual. The analysis indicated that 53 of 104 men were overfat (above 15%), but not overweight (above 110% on OWI); 28 were both overfat and overweight; 22 neither overfat nor overweight; and only one overweight but not overfat. A triceps measure above 15 mm. is, according to Mayer, a measure of overfatness. Using this measure 20 men were overfat compared with 81 on CBF. The highest r's were:

	WOW	OWI	CBF	NBF	Triceps
Ht.	.73				
AW	.86	.79	.68	.80	
OWI			.70	.91	
CBF				.72	.75

It is interesting to note that the lower r's were for CBF which was considered the standard measure. The high relationship between NBF and OWI would be expected since both procedures include height and AW in their determinations. In conclusion, the weight analysis of adult men was not enhanced by utilization of the additional indices (to CBF) in this investigation.

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April 3, 1970
11:30 a.m.

AN ANALYSIS OF EXISTING AND PREFERRED STUDENT-TEACHING PROGRAMS OF PHYSICAL EDUCATION IN INSTITUTIONS OF HIGHER EDUCATION IN THE UNITED STATES. William C. Chasey, The University of Texas at Austin.

The purpose of this study was to: (1) identify existing policies and practices utilized in the physical education student-teaching programs in institutions of higher education in the United States, and (2) elicit recommendations for preferred policies and practices from respondents who were actively engaged in physical education student-teaching programs in these institutions. A nine-page check list questionnaire designed to elicit both existing and preferred policies and practices was sent to the physical education student-teaching administrators of 455 institutions which were identified as providing off-campus student-teaching programs in physical education. The questionnaire was returned by 364, or 80 per cent of the population. The chi square statistical technique was utilized to test if the responses could have been explained by chance. Institutions were grouped and data presented according to size, geographic location and administrative control. Administrators from institutions of all classifications proposed different practices than were followed in their institutions. The preferred and existing policies and practices were the same in only 24 of the participating institutions. Respondents tended to recommend higher standards than were followed in their institutions. Larger institutions more frequently met the recommended policies and practices than did the smaller institutions. The practice which earned the maximum preference rating was not always the same as the practice recommended most highly by the largest per cent of the respondents. Data and recommendations are presented for all classifications of institutions and relate to: personnel directly involved in the student-teaching program and the nature of the student-teaching experience.

April 3, 1970
11:45 a.m.

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OXYGEN UPTAKE AND HEART RATE DURING INTERMITTENT WORK. A. A. Sucec, San Diego State College.

The purpose of this study was to determine the nature of the changes in Vo_2, Ve, and HR during an intermittent treadmill run. Eight collegiate distance runners with a mean two-mile performance of 9:18 completed two treadmill runs: (A) one to determine maximal oxygen uptake (Vo_2) and (B) another to follow changes in ventilation (Ve), heart rate (HR) and Vo_2 prior to, during and following three repeated mile runs at 319.5 m/min. (5:00 minute mile pace). The intermittent run (B) consisted of three fast runs separated by five minute walks at 76 m/min. The mean age for the runners was 19.5 yrs., while the means for weight and height were 65.3 kg and 179.8 cm, respectively. All measurements were made while the subject was in a post-absorptive state. The Ve was continuously measured by using a Parkinson-Cowan, type CI1, dry gas meter. The ventilated gas was analyzed for CO_2 and O_2 content by use of Beckman gas analyzers. Once the ventilated gas had passed through the dry gas meter, it entered a mixing chamber. Through the use of a vacuum pump a constant sample of .4 L/min was used for analysis. HR was recorded on ECG tape every thirty seconds for the duration of the tests. The results of the maximal work test showed a mean maximal Vo_2 of 70.8 ml/kg/min. and a mean Ve of 116.1 L/min. (STPD), while the highest HRs averaged 193.8 beats/min. The mean velocity of the final minute of exercise was 367.2 m/min. (4.21 mile pace). The intermittent runs produced peak Vo_2 values of 63.8, 63.8 and 63.2 ml/kg/min, while the low recovery points were 18.3, 19.2 and 18.0 ml/kg/min. as compared to 16.1 ml/kg/min. for walking prior to the first fast run. The mean HR during walking prior to the first run was 106.5 beats/min. However, following the three runs the lowest HRs were 117.5, 119.0 and 117 beats/min., respectively. The highest HR for each successive run was 181.7, 185.4 and 185.1. It was concluded that the Vo_2 during each run was equivilant, while the recovery Vo_2 showed a tendency to increase, indicating that the O2 debt was progressively increasing. The HR showed initial gains in both the high and low rates following the first run and recovery.

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April 3, 1970
1:00 p.m.

SPECIFICITY: AS RELATED TO THE EVALUATION OF TRAINING*.
Michael L. Pollock, Wake Forest University; Ardale Linnerud, North Carolina State University.

The purpose of this investigation was to evaluate and compare different modes of assessing maximal oxygen intake capacity (Max VO_2) changes as a result of training. Fourteen sedentary men between 40 and 57 years of age volunteered to train 40 minutes four times per week, for five months. A control group of seven men with similar qualifications were also tested. Training included continuous walking, with intensity increasing as adaptation occurred. Training heart rates averaged 75% of maximum capacity. Experimental subjects were administered a modified Balke treadmill test, with Max VO_2 being assessed (TM-VO_2), and a predicted Max VO_2 test after the Astrand-Rhyming Bicycle Test (EA-R VO_2). The controls were administered the predicted Max VO_2 test (CA-R VO_2). The analysis of variance was used to determine within group effects and between group differences at initial (T_1) and final (T_2) evaluation. The analysis of covariance was used to determine the training effect between groups and treatments. The .05 level of confidence was accepted as significant. Within group analyses showed the experimental group to improve significantly in both tests from T_1 to T_2, with TM-VO_2 values increasing from 29.9 to 38.8 ml/Kg · min (29%), and EA-R VO_2 from 26.1 to 28.7 ml/Kg · min (10%). Controls also improved on the CA-R VO_2 test (26.6 to 27.8 ml/Kg · min -- 4%). Further analyses showed no differences between experimentals and controls on the A-R VO_2 at T_1 and T_2, but both were significantly lower on both trials when compared to the TM-VO_2 results (T_1 = 15%< and T_2 = 35%<). Covariance analyses showed significant training effect differences between TM-VO_2 and both EA-R VO_2 and CA-R VO_2, and no difference between EA-R VO_2 and CA-R VO_2. The results question the validity of using the A-R VO_2 as a predictor of Max VO_2 and its ability to depict magnitude of change as a result of training.

*Supported in part by the United Medical Research Foundation of North Carolina and the Research and Publication Fund, Wake Forest University.

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April 3, 1970
1:15 p.m.

PHYSICAL PERFORMANCE DURING THE MENSTRUAL CYCLE* T. L. Doolittle, California State College, Los Angeles; John Engebretsen, University of California, Davis Campus.

The purpose of this study was to investigate the relationship between performance variations of females and the menstrual cycle. Sixteen college women, 18-22 years of age, free of any acknowledged menstrual disorders, performed four exercise tests at selected times during their menstrual cycles. Each subject performed one test during each of the following phases: follicular (7-10 days), ovulatory (13-15 days), luteal (18-20 days), and pre-menses (23-26 days). The tests were: 12-minute run-walk, maximum oxygen consumption, 600-yard run-walk, and 1.5-mile run-walk. Both, the order of the tests and the starting phase in the cycle were counterbalanced among the subjects. Performance means for the four phases described above (in order) were: 12-minute run-walk (miles) 1.36, 1.48, 1.37, and 1.40; maximum oxygen consumption (ml/kg/min) 44.15, 44.90, 42.26, and 44.34; 600-yard run-walk (seconds) 126.2, 125.7, 123.5, and 133.1; and 1.5-mile run-walk (seconds) 713.9, 761.3, 765.2, and 774.8. The Kruskal-Wallis One-way ANOVA was employed to determine whether the differences for each of the individual tests, due to time in the cycle, were significant. The Friedman Two-way ANOVA was employed to determine the significance of the differences for the combined performances due to time in cycle. None of the differences were statistically significant, thus indicating that performance is not dependent upon the time of the female's menstrual cycle. These findings support those of Garlick and Bernauer (Res. Qtr. Oct. '68) who found variations in physiological baselines related to the menstrual cycle that were masked by exercise.

*Supported in part by a Faculty Research Grant, University of California, Davis Campus

April 3, 1970
1:30 p.m.

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RELIABILITY AND VALIDITY OF THE TWELVE MINUTE RUN TEST FOR COLLEGE WOMEN. Barbara J. Burris, Temple University.

This study was designed to determine the reliability and validity of the 12 minute run test as a measure of aerobic capacity for college women. Thirty college women volunteers between the ages of 17 and 23 performed three trials of a 12 minute all-out run test and 2 or 3 trials of a progressive treadmill test. The treadmill speed was set at 3 miles per hour throughout the test, and the grade was increased 2½% each 2 minutes from an initial grade of 5%. Subjects walked to exhaustion and oxygen consumption was measured during the second minute of each work load. Reliability of the 12 minute run test was determined by two methods: (1) Retest reliability was determined by intercorrelating the scores for the 3 trials of the run test. The following correlations were found: Trial 1 with Trial 2 = .889; Trial 1 with Trial 3 = .889; and Trial 2 with Trial 3 = .929. (2) Analysis of variance was calculated using a two way analysis with subjects as one dimension and trials as the other. A significant day-to-day trend was found with the 3 trials, means being 1.174 for Trial 1; 1.254 for Trial 2; and 1.246 for Trial 3. Consistency coefficients calculated from the analysis of variance were .936 for the mean of 3 trials, .906 for pairs of trials with trend excluded; and .846 for pairs of trials with the trend effect included. Validity of the 12 minute run test as a measure of aerobic capacity was determined by correlating the 12 minute run performance with the following information obtained from the treadmill tests: (1) Best run performance with highest treadmill grade = .772; (2) Best run performance with greatest oxygen consumption during the treadmill test = .736; (3) Run performance with optimal work capacity, as determined from heart rate over 180, a level-off or decrease in systolic blood pressure, a respiratory exchange ratio over 1.0, and a hyperventilatory response = .732. Within the limitations of the study the following conclusions were drawn: (1) The 12 minute run test is a reliable test for college women; (2) The 12 minute run test is a valid measure of aerobic capacity for college women.

April 3, 1970
1:45 p.m.

Barbara J. Burris
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Temple University
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A STUDY OF THE VALIDITY AND RELIABILITY OF THE TWELVE-MINUTE RUN UNDER SELECTED MOTIVATIONAL CONDITIONS. George S. Wanamaker, West Texas State University.

This investigation was undertaken in an attempt to determine the validity and reliability of the twelve-minute run under each of four selected motivational conditions, and to determine differences in run performances under each condition. Volunteer subjects (N=48) were randomly assigned to one of two cells for testing purposes, as were physical activity class subjects (N=48), making two volunteer cells and two class cells. The experiment was conducted in three test administrations, using one sub-group from each cell per test administration. During each test administration the maximum oxygen intake score was determined using a motor driven treadmill and a Versatronics extended range oxygen consumption computer. After laboratory measurements for each sub-group had been attained, one sub-group from each volunteer and each class cell was administered the twelve-minute run under a different motivational condition. Subjects in one volunteer and one class cell ran as individuals and subjects in the other volunteer and class cells ran as members of groups. Running was repeated three days later. Four days later, the twelve-minute run was administered again, with volunteers and class subjects who had run as individuals twice running in groups, and those who had run in groups twice running as individuals. Product moment correlations were used to determine validities and reliabilities, and an analysis of covariance was used to determine differences in running performances. Because of the relatively low validity coefficients (.22-.53) and high error estimates, the predictive value of the twelve-minute run in terms of maximum oxygen intake is doubtful under the conditions of this investigation. There were no significant differences in running performances. Reliability coefficients suggested reasonable relationships. The twelve-minute run was not an effective predictor of maximum oxygen intake. The twelve-minute run was considered a reliable measure. Running in groups or as individuals was not effective in producing significantly different performances.

April 3, 1970
2:00 p.m.

George S. Wanamaker
West Texas State University
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THE EFFECTS OF A SUSTAINED TRAINING PROGRAM OF BREATH-HOLD SWIMMING ON SELECTED PHYSIOLOGICAL PARAMETERS AND SWIMMING PERFORMANCE. Martin L. Collis, University of Victoria.

Observation of a number of top California swimming coaches indicated that they were using an unusual method of training their swimmers, involving the daily repetition of no-breath swims of considerable distance. The apparent success of this training method, and information in the related literature, led to the hypothesis that it caused beneficial modifications in respiratory function and oxygen transport. Thus the purpose of the study was to analyze the effects of breath-hold training on competitive performance and selected physiological parameters related to respiration. In order to test the hypotheses under controlled conditions, a swimming ergometer was devized which enabled swimmers to perform tethered against a standard resistance, and which also facilitated the collection of expired air from the swimmers. Other tests were carried out in the Pulmonary Function Lab. in Stanford Hospital. The subjects were age group swimmers aged 11-14 from Santa Clara Swim Club, and the design of the experiment involved the establishment of experimental and control groups on a matched basis, with each group having 14 members. Identical pre and post-tests were performed on all subjects and the matching of groups was established primarily on the basis of the pre-test data. The independent variable was the inclusion of daily no-breath swimming as a part of the work-out for the experimental group over an eight week period, while the control group covered a similar distance with regular breathing. The post-test data was analyzed by application of a 'T' test for means with unequal variances. Results showed that swimmers in the Experimental Group displayed significant improvements in competitive performance. The Experimental Group also showed significant increases in vital capacity, and an increased ability to take up oxygen during a no-breath swim. No significant differences between the two groups were noted with regard to hematocrit. It was concluded that no-breath work was a valuable addition to the training of competitive swimmers, for while not producing radically different results from regular training, it does appear to enhance some of the physiological adaptations normally developed by competitive swimmers. The training method must be used with care because of the danger of severe anoxic reactions resulting from maximum no-breath swims after excessive hyperventilation.

Martin L. Collis
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Victoria, British Columbia, Canada

April 3, 1970
2:15 p.m.

THE ROLE OF MAXIMAL OXYGEN INTAKE IN ENDURANCE PERFORMANCE,
Victor L. Katch, University of California, Berkeley

To examine the quantitative relationship between oxygen transport capability and endurance performance, data were secured on 50 male subjects. Endurance scores were obtained on a 12 minute run on the track, and on a bicycle ergometer total work task at 900 Kg-m/min. for 2 min., with an increase of 180 Kg-m/min. each 2 minutes thereafter until "exhaustion." Oxygen intake was measured during each minute of ergometer work, the highest value per subject was designated Max VO_2,(i.e. aerobic capacity). The correlation between the endurance performance tasks was $\underline{r}$ = .51. Between Max VO_2 and the independently measured endurance run, $\underline{r}$ = .54. The correlation between total work output on the ergometer test and Max VO_2 was $\underline{r}$ = .87. Since in this task, work rate is time dependent, (i.e. longer riding time results in higher work output), and since oxygen intake is proportional to work rate and is therefore time dependent also, the within-task correlation might be spuriously high. When ergometer performance time was held statistically constant by the partial correlation technique, the correlation of $\underline{r}$ = .87 dropped to $\underline{r}$ = .20. Thus, using this type of increment work profile one should not use total work in the same task to assay the relation between work capacity and aerobic capacity--an external work capacity test is needed. It was concluded that the low correlation between the two endurance tasks was indicative of considerable specificity of individual differences in endurance performance, thus aerobic capacity could be only a partial determiner of performance, thus aerobic capacity could be only a partial determiner of performance. Furthermore, the relatively low correlation between Max VO_2 and the independently measured endurance criterion supported this interpretation.

April 3, 1970
2:30 p.m.

Victor L. Katch
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MAXIMAL OXYGEN INTAKE AND BODY COMPOSITION CHANGES DUE TO TRAINING. Robert N. Girandola, University of California, Berkeley.

The purpose of the study was to determine to what extent changes in $\dot{V}O_2$ max, resulting from a physical training program, were affected by concomitant changes in body composition. Twenty-nine college men underwent 9 weeks of endurance-type training. Densitometric measurements revealed significant increases in LBW (1 percent) and body density (3.8 percent); while decreases were found in percent fat (6.1 percent) and residual lung volume (6.3 percent). In addition, the mean $\dot{V}O_2$ max increased between 5 to 7 percent when expressed in liters/min (0.244; 6.4 percent), ml/kg (3.01; 6.7 percent) and ml/kg LBW (3.07; 5.5 percent). However, since the sample of individuals represented extremes in body composition, an analysis was made between 9 obese (>20 percent fat) and 9 lean individuals (<10 percent fat) in order to determine if the way of expressing these observed changes in $\dot{V}O_2$ max were affected by the body composition per se. For the obese group, the increases in $\dot{V}O_2$ max were 12.5 percent (liters/min), 13.1 percent (ml/kg), and 10.3 percent (ml/kg LBW). $\dot{V}O_2$ max per LBW differed significantly from the other two ways of expressing such changes. For the lean group, there were no significant differences between the 3 ways of expressing changes in $\dot{V}O_2$ max. It was concluded that when assessing cardio-respiratory adaptations of obese individuals to training, changes in body composition must be taken into account when interpreting maximal oxygen intake increases.

Robert N. Girandola
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April 3, 1970
2:45 p.m.

THE RELATION OF PERCEPTUAL STYLE TO MEASURES OF KINESTHESIS.

Virgil Engels, The University of Toledo.

The purpose of this study was to investigate the relationship of perceptual style as revealed by a rod and frame test to measures of kinesthesis as measured by an arm positioning task. Fifty male college students were used as subjects. The subjects were randomly tested in combinations of three rod and frame and three body positions. In addition each subject attempted to reproduce three arm positions with each arm. The apparatus consisted of a tilt-chair, a luminous rod and square frame, and a kinesthesiometer. Scores were recorded as deviations from the vertical or from the angular displacement of the arm with no knowledge of performance being given to the subject. In addition to identifying the relationships between the measures an attempt was made to identify the most discriminating test conditions. The correlation matrix of the various deviation scores was generated to assess relationships. Also an analysis of variance for repeated measures followed by a multiple comparisons test of the means was used to detect the most discriminating test conditions. The correlational analysis yielded several significant positive correlations between measures of perceptual style and kinesthesis. The analysis of variance and multiple comparisons tests also revealed significant differences between test conditions of perceptual style and kinesthesis. These results indicate a considerable economy of testing conditions can be utilized to determine perceptual style by the rod and frame test. The results also lend support to the concept that field independent subjects attend more to kinesthetic cues in making perceptual judgments. The concept of perceptual style also has many implications for success in complex sports activities.

April 3, 1970
1:00 p.m.

Virgil Engels
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AN INFORMATION-PROCESSING APPROACH TO THE STUDY OF A COMPLEX MOTOR SKILL.* Edith L. Lindquist, San Jose State College.

The purpose of this study was to investigate the process involved in learning to serve a tennis ball by studying how the learner approached the task and how she solved it. The subject was observed over 7 one-half hour learning sessions resulting in 769 serves. She learned the serve by observing a loop film and asking questions. Both verbal and motor data were analyzed serve by serve by means of a computer program which assigned a value to each part of the serve and printed out these individual parts with their respective values. The sum of these values for each serve was plotted and printed. These records presented a detailed as well as general picture of what was happening in the performance of the serve. In order to analyze the verbal data, a model called the General Serve Problem Solver (GSPS) based on Newell, Shaw, and Simon's model of learning, the General Problem Solver (GPS), was constructed. The verbal data were divided into 13 problems which the subject investigated. The verbal data from these 13 problems were processed by hand through the GSPS in order to determine the accuracy of the model. Results indicated that the model worked when the subject accepted the solution but not when she rejected the solution of each problem. Improvement in the performance scores took place after the subject solved a serve problem and placed the accepted part of the serve into the conceptual framework already established. This study provided new techniques in analyzing motor and verbal data. It broadened the applicability of the GPS model to include the learning of one perceptual-motor skill with a few modifications. Other factors of learning were also evident.

*This study was completed as a doctoral dissertation under the direction of Shirley Howard Cooper and Walter R. Reitman, at the University of Michigan, 1968. It was supported by a grant from the Horace R. Rackham School of Graduate Studies, the University of Michigan.

Edith L. Lindquist
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April 3, 1970
1:15 p.m.

PREMOTOR AND MOTOR REACTION TIME AS A FUNCTION OF PRELIMINARY MUSCULAR TENSION. Richard A. Schmidt and G. Alan Stull, University of Maryland.

Clarke (1968) has indicated that increased preliminary muscular tension of the hand gripping muscles decreased the reaction time (RT) for a response which was to further increase the tension as quickly as possible. The changes he observed could be due to either local or central factors (or both), and the present experiment attempted to determine the locus of the RT changes. Thus, RT was divided into two components; Premotor RT was the time from the stimulus until the first change in EMG and represented central processing time, and Motor RT was the time from EMG change until the response, and represented local delays. The experiment investigated the effects of preliminary muscular tension on these two components of RT. Apparatus consisted of a gripping handle connected to a load cell which drove one channel of a polygraph recorder. The stimulus was a buzzer, and the onset of the buzzer made a mark on a second channel of the polygraph. A third channel recorded EMG from the hand gripping muscles in the right forearm. Male, right handed Ss (n=24) squeezed to one of three submaximal tensions (while watching the load cell pen) and held that tension. At this point, the paper was started (25 cm./sec.), and either 2, 3, or 4 sec. later the buzzer sounded. The task was to squeeze as rapidly and forcefully as possible. The three tensions used were 2.2, 19.9, and 37.4 lbs. and all Ss served in each treatment in a balanced order, with 8 trials per treatment. Results failed to replicate the findings of Clarke (1968) in that Total RT did not change significantly ($F=1.2$) as a function of tension. However, there were significant ($F=5.0$) decreases (8%) in Premotor RT and significant ($F=5.4$) increases (16%) in Motor RT with increased tension. The decreased Premotor RT probably indicated that proprioceptive feedback from preliminary tension served as an "activator," and that Premotor RT reflected speeding up of central processes. The finding of longer Motor RT with increased tension probably indicated that Motor RT is not due to lags in the series elastic component of muscle (since such lags should be shorter with increased tension), and that Motor RT was probably due to lags in the contractile component of muscle. Motor RT and Premotor RT were not correlated (mean $r= + .04$) indicating that they are independent contributors to Total RT.

Richard A. Schmidt
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April 3, 1970
1:30 p.m.

AN EXAMINATION OF THE SELECTION OF CRITERION SCORES FOR LEARNING AND RETENTION. Albert V. Carron, University of Saskatchewan; Ronald G. Marteniuk, University of British Columbia.

In the analysis of human performance, it is well documented that as the number of observations which enter into a criterion score are increased, the reliability of that measure is improved. However, the situation becomes somewhat complicated in motor learning experiments where a maximal estimate of the amount learned, transferred and/or forgotten is required. As the number of trials used in the estimate of the criterion score is progressively increased, the reliability of the resultant difference score is also increased but the estimate of the amount learned, transferred and/or forgotten is progressively decreased. Thus, the purpose of the present investigation was to examine how many trials should be included in the estimates of initial and final ability level to yield a difference (criterion) score which combines relatively high reliability with a relatively high estimate of the amount of change in performance. In order to examine this problem for learning and retention, 150 high school male subjects were given 50 practice trials on the stabilometer over a period of 4 days. The practice schedules and lay-off intervals which were identical for all subjects consisted of 10 trials on Day 1 followed by a 1-day lay-off; 10 trials on Day 2 followed by a 7-day lay-off; 10 trials on Day 3 followed by a 14-day lay-off; and 10 trials on Day 4. The average learning scores (in movement units) and average reliability coefficents were 214.9 and .687 with 2 trials; 165.8 and .782 with 4 trials; 135.6 and .829 with 6 trials; 111.9 and .864 with 8 trials; and 92.3 and .909 with 10 trials. The average retention scores (in movement units) and the average reliability coefficients were 31.77 and .585 with 2 trials; 18.48 and .744 with 4 trials; 7.92 and .799 with 6 trials; -1.05 and .843 with 8 trials; and -11.00 and .876 with 10 trials. On the basis of the present results, it was concluded that the use of 4 - 6 trials in the difference score combines adequate reliability with a relatively high estimate of the amount of change in performance.

Albert V. Carron
School of Physical Education
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April 3, 1970
1:45 p.m.

THE EFFECT OF EXTENDED PRACTICE ON TASK SPECIFICITY AND GENERALITY. Paul Dunham, Jr., University of North Carolina.

The purpose of this study was to investigate the effect of 24 days of practice on the relationship between individuals' performance of two motor skills. Sixteen male college students volunteered to practice pursuit rotor and mirror tracing tasks for 24 days. On the initial day of testing subjects were randomly assigned to either begin with the pursuit rotor or mirror tracing task, to be alternated on subsequent testings. At each testing session subjects had five 20-second trials on a Lafayette 2203 Pursuit Rotor set at sixty rpm and three mirror tracing trials using the Scheidemann Mirror Drawing Pattern. Inter-trial rests were twenty seconds for the pursuit rotor, whereas mirror tracing trials were conducted one after another at the subjects' discretion with the investigator ensuring there were no prolonged delays. Data was recorded as actual time on target for the pursuit rotor and as the product of completion time and errors for the mirror tracing task. Statistical treatment of the data included correlation coefficients between tasks for each day, initial and final reliability of individual differences and tests of significance for performance change. Analysis of the data indicated generally low correlations between tasks for each of the 24 days with a few moderate exceptions. The reliability coefficients were moderate to high ranging from .62 to .92. Performance change was significant for both tasks at the .01 level. Findings of this study for the most part support the theory of task specificity as compared to generality in that there was little relationship between performance on the two tasks employed in this study when practiced over a period of 24 days.

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April 3, 1970
2:00 p.m.

THE INFLUENCE OF PHYSICAL FATIGUE ON MASSED VERSUS DISTRIBUTED MOTOR LEARNING. Calvin S. Caplan, California State College, Hayward.

The problem was to investigate the influence of interpolated severe physical fatigue on the learning of a gross motor skill using two practice schedules. The learning task consisted of climbing a free-standing ladder of special design. The subject climbed as high as possible before the ladder toppled, and immediately set it up and climbed again, in order to score as many total rungs climbed as possible during each successive 15 second time period. This task required a large amount of physical work, which increased as the subject became more skilled. Each practice schedule was performed by an experimental and control group (41 subjects in each group, 82 in each schedule). A ten minute fatiguing exercise (or a ten minute rest) was interpolated after the first 45 seconds of practice, thus placing it early in the learning period. The interpolated exercise consisted of ten minutes of heavy work (600 ascents on an 18 inch stool). The massed practice schedule consisted of eight minutes of continuous practice. The distributed schedule consisted of 15 seconds of practice followed by 30 seconds of inter-trial rest resulting in eight minutes of net practice. All subjects were retested five days later on a schedule of 30 seconds practice followed by 30 seconds of inter-trial rest. Learning was estimated as the gain in performance from the initial trials on Day 1 to performance on Day 2 (five days later). Large amounts of learning were found in all groups. Within both practice schedules, the external physical fatigue reduced learning considerably in both experimental groups. This reduction was greater under massed conditions. Comparison of the two control groups showed that learning under massed practice per se resulted in less learning than practice under distributed conditions, thus indicating that reactive inhibition and/or within-task fatigue reduces learning as well as performance.

April 3, 1970
2:15 p.m.

Calvin S. Caplan
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COMPARISON OF THE PERFORMANCE OF SELECTED GROUPS OF ATHLETES AND NON-ATHLETES ON A TRANSIT REACTION. John E. Waechter, Northeastern Illinois State College.

This study investigated the nature of human performance on a type of anticipation task called a transit reaction. The situation in which a person must anticipate when a moving object will coincide with a fixed object seems to have many applications to physical education and athletic activities. The purposes of this study were (1) to determine if there was any difference in the performance of transit reactions by selected groups of athletes (baseball players, tennis players, and trackmen) and non-athletes (2) to obtain an estimate of the duration of refractoriness for transit reactions in selected athletes and non-athletes, (3) to compare the duration of refractoriness with a reaction time measure, and (4) to compare the findings of this study with the results of other investigations dealing with transit reactions. Four groups (N = 12 per group) of senior high school boys (baseball players, tennis players, trackmen, and non-athletes) were used as subjects in the experiment. All subjects in the investigation performed transit reactions under varying experimental conditions. These conditions were (1) transit reactions without knowledge of results, (2) transit reactions with immediate knowledge of results, and (3) transit reactions with immediate knowledge of results and catch trials. Also, subjects performed simple reaction time responses. The subject's primary transit reaction task was to release a signal key at the instant when a revolving pointer and a fixed object coincided exactly. Performances were scored in terms of absolute and constant errors. It was concluded that the four groups used in this study did not differ significantly in their performance of transit reactions. The subjects' performance of transit reactions was highly accurate when they received knowledge of their results, less accurate when catch trials were introduced, and least accurate when they received no knowledge of their results. Subjects tended to stop the revolving pointer before it reached the fixed marker under the condition of immediate knowledge of results and the condition of no knowledge of results. When catch trials were introduced, subjects stopped the pointer beyond the fixed marker. A mean reaction time of 185 milliseconds was found for the subjects in this study. An estimated refractory period of 144 milliseconds was determined.

April 3, 1970
2:30 p.m.

John E. Waechter
Northeastern Illinois State Col.
Bryn Mawr at St. Louis Avenue
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ORDINAL POSITION, SIBLING'S SEX AND MOTOR PERFORMANCE UNDER STRESSFUL CONDITIONS. Daniel M. Landers and Rainer Martens, University of Illinois at Champaign-Urbana.

The differing patterns of rewards and punishments received by children of different ordinal positions in the family has been related to various personality and behavioral variables. Sampson, in his review of the ordinal position literature, gives the impression that there are no consistent ordinal position differences with respect to anxiety. Nisbett maintains that it is correct to conclude that the evidence is contradictory and confused regarding chronic anxiety and situational anxiety, but the evidence concerning first-borns' aversion to physical danger has been found consistently. This study determined if first-borns, due to different parental treatments and/or sibling relationships, are more aversive to physical harm than later-borns. In addition, sibling's sex was used as an independent variable since it has been shown to be an important variable when used in conjunction with ordinal position. Sixty first- and second-born junior high school boys who had a sibling within 1-3 years of their age were assigned to one of three stress conditions (threat of electric shock). Heart rates and the subjects' own ratings of his nervousness were obtained to ascertain the effectiveness of the stress manipulation. A 2 X 2 X 3 factorial design was used. The motor task used in this study involved tracking of a ring along a 52" irregularly shaped aluminum tube, which it encircled, without making contact. Each time the ring contacted the tube an electrical circuit was completed and recorded on an electrical counter. The frequency of contacts for one pass over the tracking surface constituted the score for one trial. Each subject took 5 trials. Although the results showed no differences between stress conditions on subjects' self-reports of their nervousness, a significant heart rate difference indicated that two levels of stress were effectively created. The results failed to support the contention that first- and second-borns differ in response to physical harm stress. However, significant interactions on both the heart rate and performance measures when summed over stress conditions indicated that first-born males with younger brothers had higher heart rates and poorer performances than the other sibling's sex-ordinal position combinations in two-child families.

Supported by U.S.P.H.S. Grant MH-07346 and D.M.H. Grant 9424.

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April 3, 1970
2:45 p.m.

THE FUNCTION OF LATERALITY IN MOTOR PERFORMANCE. Harriet G. Williams, The University of Toledo.

Preferential use of one part or one side of the body (handedness, eyedness) has long been a topic of interest to educators. This is due, in large part, to the relationship which purportedly exists between laterality, cerebral dominance, and certain language and cognitive functions. With the advent of certain perceptual-motor training programs (in particular the Doman-Delcato system), the concept of "sidedness" has tended to assume an even greater prominence in the thinking of educators concerned with the learning process in young children. Such approaches emphasize the importance of developing a complete and clearly defined laterality. The assumption is that unless the child has developed this preferential use of one side of the body, proper "neurological organization" is not possible and the child may be expected to exhibit some difficulty in the performance of a variety of perceptual, motor and/or cognitive tasks. The questions raised in the present study were: (a) What is the incidence of pure or complete sidedness in a population of fourth grade elementary school children; and (b) What effect does the degree of lateralization of body function have upon the performance of selected motor tasks? The data reported here are a part of the Toledo Growth Study, a longitudinal study concerned with the growth and development characteristics of elementary school children. Subjects were 147 fourth grade children from three elementary schools in the Toledo area. Laterality was assessed as follows: the body part used by the individual at least 75% of the time in performing a variety of activities involving the use of the eye, hand, or foot. Subjects were assigned to a "pure" or "mixed" sidedness category. Motor performance measures included an overarm softball throw for distance, standing broad jump, a dynamic balance task, an agility run, and a pursuit rotor task. Normative data were organized in the form of percentages of "pure" vs. "mixed" sidedness in the population studied. The analysis of variance technique was used to assess the effect of the degree of lateralization of body function upon the performance of the five motor tasks. Of the individuals studied, only 38% exhibited "pure" or complete one-sidedness, the remaining 61.2% showing "mixed" or crossed dominance. The degree of lateralization of body function had no significant effect upon the proficiency with which the various motor tasks were performed. According to these data, then, the value of training or developing complete one-sidedness in the individual with respect to increasing proficiency of motor performance is open to question.

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April 3, 1970
3:00 p.m.

RELATIONSHIP BETWEEN DEPTH PERCEPTION AND HAND-EYE DOMINANCE AND BASKETBALL FREE-THROW SHOOTING IN COLLEGE WOMEN. Jacqueline Shick, Northern Illinois University.

Subjects were 32 female college students enrolled in basketball classes. Each student took a total of 50 free throws, with 10 shots being taken on each of 5 days. Depth perception measures used in this study were the stereopsis test for the Bausch and Lomb Ortho-Rater and a modified version of the Howard-Dohlman apparatus. The stereopsis test was administered 3 times, complying with the recommendations of the manufacturer, and yielded a reliability coefficient of .899. Distances at which the subjects were tested, using the modified Howard-Dohlman apparatus, were 10', 20', and 30'. Each subject was given 4 trials at each distance, 2 trials starting with the right dowel forward and 2 trials starting with the left dowel forward. The right-left order was randomized among the subjects. The total test had a reliability coefficient of .944. Eye dominance was determined by the "hole-in-the-card test;" handedness by the preferred hand for performing basketball skills. Of the 32 subjects, 21 had unilaterality in their dominance (18 right; 3 left) while 11 had contralaterality in their dominance (10 right-handed, left-eyed; 1 left-handed, right-eyed). Within the limitations of this study, the following results were obtained. 1. The two measures of depth perception used in this investigation did not measure the same aspects of the trait ($r = -.5107$). 2. Neither depth perception measure was related to success in free-throw shooting for college women ($r = .057$ for stereopsis test; $r = .0006$ for apparatus). 3. With regard to shooting and dominance, data on the percentage of errors toward the side of the non-dominant hand were subjected to an analysis of variance of unweighted means for repeated measures with the following results. No significant trial-to-trial variations took place. A significant F-ratio ($p < .001$) was obtained when comparing unilaterally dominant subjects with contralaterally dominant subjects, with the latter having the higher percentage.

April 3, 1970
3:15 p.m.

Jacqueline Shick
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EFFECTIVENESS OF SPECIFIED PHYSICAL EDUCATION PROGRAMS AND ESTABLISHMENT OF SELECTED MOTOR PERFORMANCE NORMS FOR THE TRAINABLE MENTALLY RETARDED. Gary D. Sharpe, University of Missouri.

The purpose of this study was twofold: (1) To determine whether selected physical education programs could effect significant motor performance gains by the trainable mentally retarded and (2) To establish normative levels of performance by the trainable mentally retarded with respect to selected perceptual-motor activities. Three separate populations were defined for this study, one each for the State School for the Trainable Mentally Retarded at St. Louis, Springfield, and North Kansas City. A random sample of eighty students, divided into four groups of twenty constituted the sample drawn from the St. Louis population. Three of these four groups were subjected to independent physical education programs over a period of fifteen weeks. The fourth group was a control group. Non-random samples of thirty-four and thirty-seven were selected from the populations of Springfield and North Kansas City, respectively. Both samples were divided into an experimental group and a control group receiving no physical education. To establish normative levels of motor performance by the trainable mentally retarded, means and standard deviations were computed in age groupings 6-8, 9-11, 12-15, 16-19, on thirty-one individual items of three test criterion instruments. Six major hypotheses and eighty-seven minor hypotheses were formulated and submitted to statistical tests of significance. The major hypotheses involved motor performance gain by the trainable mentally retarded on three test criterion instruments. The null hypothesis was rejected in five of the six cases. Within the limitations of this study, it was concluded that: 1. Physical education programs will effect significant differences in motor performance gains by the trainable mentally retarded. 2. The various physical education programs specifically designed for this study to improve basic motor skills appeared equally efficient in effecting motor performance gains by the trainable mentally retarded. 3. Relative to chronological age change, the motor performance level of the trainable mentally retarded child is likely to follow one of two patterns: a. Decrease sharply following the primary years (6-8) and, then, gradually increase through young adulthood (16-19) reaching a level similar to that of the primary years, or b. Increase steadily from the primary years through young adulthood. 4. Studies involving motor performance gains by the trainable mentally retarded should use test batteries rather than individual items of tests.

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April 3, 1970
3:30 p.m.

MOTOR LEARNING OF MENTALLY RETARDED, BRAIN INJURED, AND FAMILIAL CHILDREN. David M. Auxter, Slippery Rock State College

A study was made of familial mentally retarded and brain-injured mentally retarded children. The purposes of this study were to compare: 1) rates and amounts of learning; 2) and to examine possible difference in learning trends. The study compared two groups, 22 of which were diagnosed as familial mentally retarded; the other 22 subjects were classified as brain injured. The mean age of the familial group was 13 years, 11 months and the mean IQ was 59. The mean age of the brain injured was 14 years, 1 month and the mean IQ was 55. The children had been diagnosed in accordance with AAMD recommendations. Each subject performed 25 trials on the stabilometer which was used to measure motor learning. Five successive trials with twenty second rest intervals were completed on five successive days. The findings of the study indicate the following: 1) There was no significant difference in the rate of learning on the early trials of the learning task between mentally retarded children who are familial and brain injured. 2) Learning plateaus and decrements in performance in brain injured mentally retarded children appear earlier in learning than in familial mentally retarded children. 3) Over the entire study the familial mentally retarded children learned significantly more than the brain injured children on motor learning tasks involving rapid adjustive movements of vestibular and kinesthetic functioning.

April 3, 1970
3:45 p.m.

Dr. David Auxter
Slippery Rock State College
Slippery Rock, Pa. 16057

CARDIOVASCULAR FUNCTION OF THREE AGE GROUPS OF MENTALLY RETARDED AND NORMAL BOYS. Charley H. Shannon, Angelo State University

The purpose of this study was to compare the resting heart rate, anticipatory heart rate, recovery heart rate, and exercise time at three age levels of subjects with normal intelligence to the same age levels of trainable mentally retarded subjects. Two electrodes were affixed to the chest as leads to a battery-operated, transistorized cardiotachometer. The heart rate was recorded for five minutes at 30-second intervals while the subject rested. The last thirty seconds of the resting period were preceded by vocal and mechanical stimuli to induce an anticipatory heartbeat. Then the subject walked on the treadmill at 3.5 miles per hour. For the first two minutes the elevation remained level. Thereafter, the treadmill was elevated two percent per minute. The subject remained on the treadmill for a maximum of 12 minutes unless the heart rate of the subject reached 170 beats per minute. Total exercise time was recorded. Upon completion of the exercise, the subject returned to a resting position on a table and the recovery heart rate was recorded. The data were analyzed using the single-classification analysis of variance and the analysis of variance of trend components. The performance times of the 15-year-old retardates were less than the exercise times of all three groups of normal subjects. This difference was significant. The heart rates of the 13-and 15-year old normal subjects recovered more rapidly than the heart rates of the retardates of the same age groups. This difference was significant. Increase in age did not result in any significant difference in the heart rates of the retarded subjects. Age of the normal subjects did not result in any significant difference in the resting heart rate, the anticipatory heart rate, or the exercise time. A significant difference was found between the groups of normal subjects in recovery heart rate at several intervals. Within the limitations of the sample studied, the results indicate that retardates gradually fall behind normal subjects in measured heart rates. By the fifteenth year the capacity for exercise and the recovery ability after exercise for the retardates is significantly different from that of the normal subjects.

April 3, 1970
4:00 p.m.

Charley H. Shannon
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EFFECTS OF THREE DIFFERENT CONDITIONING PROGRAMS ON MENTALLY RETARDED CHILDREN. Thomas J. Martin, Virginia Polytechnic Institute; Helen K. Wilson, Wichita, Kansas.

Ninety-three mentally retarded children of junior high school age, with IQ's ranging from 60 to 90, participated in a four-week program to evaluate the effects of various types of conditioning programs as measured by the AAHPER Fitness Test. These children were randomly put into three groups. All students took the AAHPER Fitness Test; then they were entered into a program of circuit training, volleyball, or quiet games and at the end of four weeks were tested again, using the same fitness test. An analysis of variance was conducted to determine whether significant differences existed between groups in each of the seven test items. No significant differences were uncovered at the .05 level. The t-test for paired data was conducted to determine the significance of the difference from the pre-conditioning to the post-conditioning test. This was done for each of the seven test items for the three groups studied. Circuit training, at the .05 level, revealed a negative effect of conditioning in the softball throw and standing broad jump. There was a positive effect of conditioning in the pull-up test. Although not significant, the shuttle run showed a positive improvement from the conditioning period. Results in the volleyball group revealed a negative effect of conditioning in the 600 yard walk-run and the standing broad jump. The softball throw was not significant but indicated a possible negative reaction to conditioning. The quiet games group showed significant positive improvements in pull-ups and significant declines in the softball throw and the standing broad jump. These tests were also conducted at the .05 level. It was concluded that all three conditioning programs had a significant negative effect on the standing broad jump. The circuit training and quiet games programs significantly decreased performance in the softball throw; the volleyball program also seemed to decrease performance in this event, although the results were not significant. The playing of volleyball did not significantly increase arm strength as measured by pull-ups. Pull-ups scores were significantly improved by the quiet games and circuit training programs.

Thomas J. Martin
V.P.I., Dept. of HPE
Blacksburg, Virginia 24061

April 3, 1970
4:15 p.m.

RELIABILITY OF CARDIOVASCULAR EVALUATION OF MENTALLY RETARDED SUBJECTS.* Donald E. Campbell, Oregon State University.

The purpose of this investigation was to assess the reliability of a selected standardized test of sub-maximal cardiovascular performance in a test-retest situation on a group of trainable mentally retarded (TMR) subjects in order to determine the appropriateness and practicality of the procedure for evaluating the cardiovascular performance of TMR subjects. Permission was obtained from a state institution for the mentally retarded to measure a limited number of TMR males. Within this limitation, six subjects between 12-16 years of age were selected from the institution population. All subjects are cleared medically by a staff physician and then participated in two orientation excursions on a treadmill. When each subject had completed the two orientation sessions, two trials of the Balke test were administered with seven days between trials. All trials were administered while the subject was in a basal state. Resting, performance, and recovery heart rates were obtained by means of wire leads from two surface electrodes to an all transistor cardiotachometer which was equipped with a digital counter which was triggered by the R spike of the QRS segment of the ECG complex. Graphic presentation of the resting, performance, and recovery heart rates for T_1 and T_2 did not appear to differ in general configuration from results reported for normal subjects. The F-ratio obtained by a subjects-by-trials analysis of variance would suggest that no significant difference existed between trial means for any minute of the three conditions. With the exception of the first minute of recovery, the r values obtained by the Pearson product-moment formula would suggest a high correlation between trials. Snedecor's formula for the reliability of individual ratings was also applied to the data in order to obtain intraclass correlations. These values also suggested high correlation between the two trials. The TMR subjects demonstrated cooperativeness and eagerness to perform as well as the ability to learn the motor skills necessary to perform the treadmill task. The total results suggest that the Balke Treadmill test is an appropriate and practical means to obtain a reliable measurement of the cardiovascular performance of TMR subjects when such subjects are given a preliminary orientation and experience on the treadmill.

*This study was supported in part by The University of Texas Research Institute project R-0422

Donald E. Campbell
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April 3, 1970
4:30 p.m.

MOTOR ABILITY OF VISUALLY-IMPAIRED CHILDREN. B. Robert Carlson, University of Kansas; Patricia Gallagher, University of Kansas; Sue Synoveck, Kansas School for the Blind.

The purpose of this study was to assess the current status of the motor ability of residential lower-elementary, visually impaired children. This study was conducted at the Kansas School for the Blind in 1969. The 18 subjects were the entire mobile population of grades 1-4. The mean age of the subjects was 9 years, while the mean height and weight were 51.5 inches and 66.1 pounds respectively. The subjects were all legally blind and had been blind since birth. The Brace Motor Ability Test was used to assess the motor ability of the subjects. Form M and Form N were administered at two different locations. One-half of the subjects took Form M first, while the remaining subjects began with Form N. The standard items of the Brace Motor Ability Test were used without modification. Due to the visual impairment of the subjects, the procedure of test item presentation differed from that suggested by Brace. The scoring of the items was modified in accordance with recommendations from research studies conducted at the University of Texas. Means, standard deviations and ranges were used to describe the data. A Pearson product-moment correlation was used to relate the subjects' performances on the two forms of the test. Since nine of the subjects did possess residual vision, the scores for the subjects were then divided into two groups based on extent of vision impairment of the subject. The results of the motor ability tests were then analyzed by a treatment by groups analysis of variance design. The lack of a significant difference between the groups indicated that the minimal perception available to those subjects with residual vision was of no additional assistance when the subjects were performing stunt-type motor skills. The boys performed significantly better than the girls. The two forms of the Brace Test yielded related but significantly different results.

B. Robert Carlson
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April 3, 1970
4:45 p.m.

CHARACTERISTICS OF GIRLS DEMONSTRATING EXTREME PERFORMANCES ON A PHYSICAL-MOTOR FITNESS TEST. Anne F. Millan, Brookline Public Schools, Brookline, Massachusetts.

The purpose of this study was to investigate those girls demonstrating highest and lowest scores on a physical-motor fitness test so that remediation procedures could be established. One hundred and forty-six girls in grades five, six, seven, and eight participated in a physical-motor fitness test battery consisting of these items: arm strength, abdominal strength, leg power, muscular endurance, and speed-agility. Making use of national norms, it was possible to group girls into upper and lower quartiles for further study. The following records of high and low scorers were examined: weight-control, participation in required and voluntary programs, body build, and health history. Weight-control was the only statistically significant factor in this study. The high scorers were primarily underweight, secondarily of normal weight, with two subjects slightly overweight. While overweight was the most common and significant factor among low scorers, it was not the only factor. The very few low scores made by normal weight and underweight girls seemed to follow no pattern. The etiology of low fitness, other than overweight, ranges from somatotype extreme to problems of a physical or emotional nature. This study suggests that girls in our school system are more in need of weight-control programs than of remedial exercise designed to "pass a test." The study further suggests that medical follow-up is essential for the girl with low fitness.

April 3, 1970
5:00 p.m.

Anne F. Millan
Brookline Public Schools
Brookline, Massachusetts 02146

INFLUENCE OF GAIT PATTERNS ON HIP ROTATION AND FOOT DEVIATION.
H. H. Merrifield, Ithaca College; Diane Senefelder, Columbia Presbyterian Medical Center.

The purpose of this investigation was to assess the relationships between gait patterns, rotational components at the hip joint and foot deviation. Sixty female subjects ages 18 - 22 years, exhibiting either in-toeing, out-toeing or toeing straight ahead gait patterns, were tested in two identical sessions, held on two separate days. Each test session included bilateral measurements of maximum inward and outward rotations at the hip joint, and the amount of pronation or supination that existed in the feet. Rotation measures were recorded with the subject in the supine position; whereas the foot recordings were performed with the subject in a weight-bearing position. No subject demonstrated a supinated foot position during the testing. The test-retest method determined correlation coefficient values between .939 and .976. The data were grouped within each gait pattern and correlations were determined between all the variables in both extremities. Analysis of variance was applied to the data to determine if significant differences occurred among the means. When significant F values were obtained at the $P < .05$, the differences among means were tested by the Scheffé test to determine which means were significantly different. The results indicated statistically significant differences in internal and external hip rotation between the in-toeing and out-toeing gait pattern groups. Internal rotation was significant between the in-toeing and straight ahead gait pattern groups. The correlation coefficient revealed a significant relationship between external rotation and pronation in the toeing-out gait pattern group.

April 3, 1970
5:15 p.m.

H. H. Merrifield
Division of Physical Therapy
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PROGRESSION OF LATERAL ASYMMETRIES IN THE PELVIS AND LEGS OF ELEMENTARY THROUGH SENIOR HIGH SCHOOL AGE BOYS, 1964-1969, 585 SUBJECTS. Karl K. Klein, The University of Texas.

The purpose of the study was to trace the progression of lateral asymmetries of growth in the pelvis and legs of growing children and to determine the progression between the three age levels in terms of the significance of change between the three groups. Population samples from the three grade levels: Elementary (N-187), Junior high (N-211) and Senior high (N-187) were taken from physical education classes from eight public schools in Austin, Texas. Manual measurement procedures for levelness or asymmetry of the posterior iliac spines in the standing position were taken. Calibrated blocks were placed beneath the heel on the low iliac spine to level the two point of measurement. The amount of lift used was determined to be the amount of lateral imbalance. Reliability coefficients of .94 - .97 and Objectivity coefficients of .94 - .96 were obtained by experienced testers. A Single Classification Analysis of Variance was used for intragroup comparisons and "F" ratio significance, and the Lindquist Multiple "t" to test for group influence if "F" was significant. Intragroup comparisons of the 459 subjects demonstrating lateral symmetry produced an "F" of 80.32. Significant multiple "t" were obtained between all groups: elementary to junior high of 9.16; elementary to senior high of 12.61; and junior high to senior high of 4.08. The thesis that lateral asymmetries discovered in the elementary school student would show evidence of progression during the growing years was well illustrated within the samples tested. The indication that the progression was not consistent was demonstrated in that the greatest change took place between the elementary and junior high age levels but was continuous into the senior high age level.

This study was supported by the University of Texas Research Institute R-233. L-520 and R-778 1964-67; SRF 298 1967-68 and the Department of Physical Education for Men 1968-69.

Karl K. Klein
Division Of Physical Education - Men
The University of Texas
Austin, Texas 78712

April 3, 1970
5:30 p.m.

THE RELATIONSHIP BETWEEN PERSONAL-SOCIAL ADJUSTMENT, PHYSICAL FITNESS AND ATTITUDE TOWARD PHYSICAL EDUCATION AMONG HIGH SCHOOL GIRLS WITHIN VARYING SOCIOECONOMIC LEVELS. Mary L. Young, University of Minnesota.

The purpose of this study was to determine: (1) whether significant differences exist between high, middle and low socioeconomic groups with reference to personal-social adjustment, physical fitness and attitude toward physical education; (2) whether there are significant relationships between these variables; (3) whether there is a significant relationship between a question dealing with individual-group participation preference and low physical fitness, negative attitude toward physical education, low personal-social adjustment and socioeconomic status. One hundred fourteen junior girls in a suburban high school were given the AAHPER Youth Fitness Test (1955), the California Test of Personality (1953), the Wear Attitude Inventory (1955) and a physical education questionnaire. Socioeconomic status was determined using McCall's Scale (1953). Three groups were used: high N=25, middle N=78, and low N=11. Statistics were done on the 6600 computer. The programs used were UMST 610 - General Linear Hypothesis for Anova and UMST 530 - Missing Data Correlations. Within the limitations of this study and with specific reference to eleventh grade girls, the following conclusions seem justified: (a) There are no significant differences between socioeconomic groups with reference to physical fitness or attitude toward physical education. There is a significant difference (.01 level) in the matter of personal-social adjustment, personal adjustment (.01 level) and social adjustment (.05 level); (b) There is a significant positive correlation between physical fitness and attitude for the entire population (.001 level), within the middle group (.001 level) and within the high and low groups (.05 level); (c) There is a significant positive correlation (.05 level) between physical fitness and personal adjustment for the entire population and within the middle group; (d) Physical fitness and social adjustment are not significantly related; (e) There is a significant positive correlation (.01 level) between personal adjustment and attitude, between social adjustment and attitude (.001 level) and between personal-social adjustment and attitude (.001 level) within the middle group. Within the low socioeconomic group, there is an inverse and significant correlation (.01 level) between social adjustment and attitude; (f) Sixty percent of students who are below the 25th percentile on the physical fitness test and 63% of students who had a negative attitude toward physical education prefer to participate in physical activity either alone or with one other person.

Mary L. Young
106 Norris Gym
University of Minnesota
Minneapolis, Minnesota

April 3, 1970
5:45 p.m.

POSTURE PATTERNS IN FEMALE GROWTH AND DEVELOPMENT. Anne Millan, Public Schools of Brookline, Massachusetts.

The purpose of this study was to investigate the frequency of both lateral and anteroposterior deviations as they relate, primarily, to chronological age in girls. The postures of 320 girls (total samples) from ages eight and a half through fourteen were analyzed by means of photography and a posture frame. Frequency of deviations was noted by an orthopedic surgeon, the school physician, and the author. Through the use of the statistical technique "Standard Error of the Difference between Two Percentages", it was possible to determine that there is a significant difference among age groups in regards to postural deviations. Specifically, the greatest frequency and multiplicity of profile deviations were noted in the younger girls. The few exceptions to this pattern were clear-cut: "good" posture profiles were noted in those few younger girls whose physiques were dominated by mesomorphy. The most "correct" and attractive anteroposterior postures were demonstrated by the older girls. Exceptions to this pattern, likewise, were few and noteworthy: extreme ectomorphy or lack of activity in the older girls seemed to accompany poor posture. Lateral deviations, on the other hand, showed a very different relation to age. While lateral imbalance was common to rather large percentages of all groups, severe deviations were noted most often in the older girls. Incidental findings suggest that the "plumb line test" has inadequacies, that profile posture is overemphasized at the expense of lateral posture, and that the photograph is the single most valuable instrument for both evaluation and motivation in posture. Conclusions of the study imply consideration of chronological age when establishing both screening and remedial procedures in the posture program.

April 3, 1970
6:00 p.m.

Anne F. Millan
Brookline Public Schools
Brookline, Massachusetts 02146

THE RATE OF BLOOD LACTATE ACCUMULATION IN WORLD CLASS SWIMMERS COMPETING AT LOW AND HIGH ALTITUDES. Loren G. Myhre, James E. Counsilman, and John D. Pettinger, Indiana University.

The purpose of this investigation was to study the relationships between blood lactate concentration and swimming performance in swimmers competing at low and high altitudes. Three world class swimmers, two young men and one young woman representing the United States in the 3rd Pre-Olympic Games in Mexico City, were selected as subjects for this investigation. Control measures at Bloomington (altitude 850 feet) were followed by repeating the same experiments at Mexico City (altitude 7350 feet) less than two weeks later. Briefly, the experiments included in this study were as follows: (1) All-out performance (400 meter freestyle), and (2) Sub-maximal performance (100 and 200 meter freestyle swum at 400 meter pace). A time trial at Bloomington was followed by international competition in the same event in Mexico City. Swimming times were recorded for each length (50 meters) of the race. Blood was drawn from an arm vein during the third minute of recovery for determination of lactic acid concentration. The swimming performance in the 400 meter freestyle averaged 3 seconds faster during the international competition in Mexico City than at the time trials in Bloomington. However, this very slight improvement in swimming time was achieved at the expense of a much greater accumulation of blood lactate averaging 34.5% above that observed for the same race at Bloomington. One of the limiting factors in all-out work performance is the accumulation of large amounts of lactic acid in the blood and muscles. Although the upper limit of tolerance for this metabolite varies among individuals it does, nevertheless, represent the end point of muscular activity, i.e., exhaustion. The lowered pO_2 at high altitude results in a lowered maximal oxygen consumption and, consequently, an earlier build up of blood lactate in all-out work. The determination of an athlete's maximal tolerance for lactate coupled with the determination of the rate of lactate accumulation during a competitive race provide guidelines for the proper adjustment of the racing pace in order to allow the athlete to achieve his best possible performance.

April 4, 1970
1:00 p.m.

Loren G. Myhre
Dept. of Physical Education for Men
Indiana University
Bloomington, Indiana 47401

THE EFFECT OF WOMEN'S GYMNASTICS ON AEROBIC CAPACITY, STRENGTH, FLEXIBILITY, AND ANTHROPOMETRIC CHARACTERISTICS. L. Dennis Humphrey and Harold B. Falls, Southwest Missouri State College.

The purpose of the study was to determine the effects that a full season of gymnastics practice and competition have on aerobic capacity, strength, flexibility, and anthropometric characteristics of college women. Subjects for the study consisted of the eight girls who completed the 1968-1969 gymnastics season at Southwest Missouri State College. At the onset and at the completion of the gymnastics season the following parameters were determined: VO_2/kg/min.; maximum minute ventilation volume during exercise, BTPS; duration in minutes of a graded exercise on a bicycle ergometer; body weight; body fat in kilograms; percent body fat; total proportional strength; Wells' Sit and Reach; and hyperextension flexibility of the spine. The preseason and postseason means for the above parameters were treated by the application of t test for correlated samples, and the .05 level of significance was established as the level of rejection. Statistical analysis revealed that only the difference between the preseason and postseason means for the Wells' Sit and Reach was significant. Comparison of the nonsignificant parameters indicated that aerobic capacity demonstrated a slight decline. Anthropometric measures remained fairly constant, and there was a positive gain in strength and hyperextension of the spine. Based on the limitations and scope of this study the following conclusions appear warranted. Without special training emphasis, aerobic capacity, strength, and percent of body fat do not show significant positive gains during the women's gymnastics season. The flexibility of female gymnasts improves significantly during the season.

April 4, 1970
1:15 p.m.

L. Dennis Humphrey
Southwest Missouri State College
Springfield, Missouri 65802

THE RELATIONSHIP BETWEEN CARDIOVASCULAR FITNESS AND SELECTED PULSE WAVE MEASURES IN YOUNG BOYS. Dorothy E. Dusek, San Francisco State College.

The purpose of this study was to investigate the relationship between features of the external carotid pulse wave, which have been reported to reflect arterial elasticity, and the cariovascular fitness level of elementary school children. One hundred fifth and sixth grade boys were randomly selected from two Toledo, Ohio, elementary schools. Each subject was given the Cooper Twelve-Minute Run-Walk test in order to establish his cardiovascular fitness level. The cardiovascular fitness score showed the distance attained in 12 minutes, measured to the last twentieth of a mile completed by the subject. External carotid pulse waves of each subject were recorded on a Sanborn twin-beam recorder, and from three separate readings an average figure was obtained for dicrotic index and dicrotic wave index. A multiple correlation coefficient of .1361 was calculated and showed an insignificant relationship ($p > .05$) between cardiovascular fitness scores and the pulse wave measures: therefore, it could not be concluded from the results of this study that a relationship between cardiovascular fitness and arterial elasticity, as measured by the carotid pulse wave, existed in the population studied. Insignificant differences between the multiple correlation coefficients of the two schools and the two grade levels showed that neither school nor grade level significantly influenced the multiple correlation coefficient of the total sample. Mean scores for each of the three variables, i.e., cardiovascular fitness, the dicrotic wave index, and the dicrotic index, were reported.

April 4, 1970
1:30 p.m.

Dorothy E. Dusek
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San Francisco State College
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TREND ANALYSIS OF ENDURANCE-TYPE INTERVAL TRAINING. Charles Brooker, Slippery Rock State College.

This study was structured to determine whether endurance type interval training segregated three groups of subjects who were trained at different intensities. The criterion for intensity was the time required to reach each of three different heart rates, and the criterion for difference was not primarily pre and post testing, but rather the time course of adaptation to the training. Fourteen randomly selected male subjects, between the ages of 19 and 22, were randomly partitioned into three groups containing 5, 5, and 4 subjects respectively. The three groups trained for thirty consecutive days under a regimen consisting of a daily training bout with a 24 hour interval between bouts. Group I exercised on the bicycle ergometer at 75 rpm and a power demand starting at 5 kg-M/sec which was augmented by 5 kg-M/sec each minute of exercise. The bout was haulted when the subjects had reached a heart rate of 180 bpm. Groups II and III performed at the same rpm and power demand as Group I, but Group II halted exercise at 150 bpm and Group III at 120 bpm. The time required for each subject to reach the indicated heart rate was tabulated. The data were subjected to intraindividual correlation to determine whether the use of group means was justified. The resulting coefficients were equal to or greater than R=.900 in each case, therefore, the means of each group during each training session were used for treatment. Polynomial regression analysis showed that each of the three training types elicited significantly different curves which described the time course of training adaption, but that within each group the individual curves were familial although the intercepts varied. Tests to determine whether runs were randomly distributed about the regression line indicated that the variability was not random noise and consistent trends were sought. Triple exponential smoothing and auto-correlation revealed the existence of two clear cyclical trends in the 180 group based upon a 3.6 day plateau superimposed upon a 15 day sinusoidal variation, no observable trend in the 150 group, and a sinusoidal trend with a 28 day period in the 120 group. The change over time in the 120 group was so small as to be statistically insignificant, whereas both the other groups produced significant changes at the 0.05 level as a result of training. According to the regression analysis the 150 group ceased to improve after the 24th day, while the 180 group, which also levelled off at the 24th day started to improve sharply at the 27th day and climbed almost exponentially at the 30th day.

Charles Brooker
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Slippery Rock State College
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April 4, 1970
1:45 p.m.

THE EFFECTS OF TRAINING FREQUENCIES ON THE RETENTION OF CARDIOVASCULAR FITNESS. Paul H. Brynteson, South Dakota State University; Wayne E. Sinning, Springfield College

The purpose of this investigation was to study the effects of different training frequencies of weekly exercise exposures on the retention of cardiovascular fitness following a physical conditioning program. The study was limited to twenty one male volunteer subjects who ranged in age from twenty to thirty-eight years. There were two parts to the study. The first part consisted of a five-week physical conditioning program to improve the cardiovascular fitness level of the subjects. During this period all subjects trained five days per week for thirty minutes a day on a bicycle ergometer. The second part of the study consisted of a five-week post-conditioning period where subjects trained either one, two, three, or four days per week. The subjects were tested before physical conditioning (Test I), after physical conditioning (Test II), and after the completion of the post-conditioning period (Test III). The subjects were tested for the following: (1) maximal oxygen uptake (maximal $\dot{V}O_2$), (2) maximal pulmonary ventilation (maximal $\dot{V}_E$), (3) maximal heart rate, (4) five-minute recovery heart rate, (5) oxygen pulse, (6) ventilation equivalence for oxygen ($\dot{V}EO_2$), (7) post-exercise blood pressure, (8) recovery blood pressure, (9) maximal work load, (10) maximal voluntary ventilation (MVV_{80}), (11) forced vital capacity (FVC), (12) forced expiratory in one second ($FEV_{1.0}$), (13) hemoglobin, and (14) hematocrit. Significant gains occurred from Test I to Test II in maximal $\dot{V}O_2$, maximal work load, maximal $\dot{V}_E$, $FEV_{1.0}$, % $FEV_{1.0}$ of FVC, recovery heart rate, and oxygen pulse. Analysis of results from Test II to Test III indicated that a minimum of three days per week of conditioning was necessary to maintain cardiovascular fitness.

Paul H. Brynteson
Department of HPER
South Dakota State University
Brookings, South Dakota 57006

April 4, 1970
2:00 p.m.

THE EFFECTS OF A MODERATE EXERCISE PROGRAM ON THE MYOCARDIAL FIBER-CAPILLARY RATIO OF PRE-PUBESCENT AND POST-PUBESCENT RATS.

R. D. Bell, University of Saskatchewan; R. L. Rasmussen, St. Francis Xavier University.

Thirty pre-pubescent and thirty post-pubescent male albino rats (Wistar) were divided into exercise and control groups of equal size. The exercise groups were subjected to a thirty-minute swim daily five days a week for six weeks. The control groups remained in a sedentary state throughout the experiment. After completion of the training period each animal was anaesthetized and the beating heart was isolated. Following aortic cannulation the heart was perfused with a perfusate composed of 20% carbochrome ink, 0.2% heparin, and 97.8% Locke's solution. The heart was then quick frozen and sections 15 microns thick were cut from the mid-ventricular region of each animal heart. The hearts were then stained with a hematoxylin and eosin stain. Mean myocardial F-C ratios were then determined for 10 animals of each experimental group. A two-by-two analysis of variance revealed a significant difference (.05 level of confidence) in the myocardial F-C ratio between both the pre-pubescent and post-pubescent groups as well as between the exercise and control groups. The results would seem to indicate that a moderate exercise program can significantly alter the F-C ratio in the heart especially if the exercise is administered during the pre-pubertal period of life.

April 4, 1970
2:15 p.m.

R. D. Bell
School of Physical Education
University of Saskatchewan
Saskatoon, Saskatchewan, Canada

THE DEVELOPMENT OF HEALTH AND PHYSICAL EDUCATION IN ALABAMA SCHOOLS. James E. Sharman, University of Alabama in Birmingham.

This paper presents an account of the significant historical events contributing to the development of school health, physical education, and athletics in Alabama. It attempts to define the problems encountered in the development and to recognize the leaders who have contributed to its growth at the elementary, secondary, and college levels. The investigation was carried out over a period of several years and utilized many resources. State organizations promoting school health, physical education, and athletics were studied initially. Minutes of meetings, documents, newspapers, periodicals, and many personal interviews and letters were used in the historical study of the organizations. Following the study of the four most significant organizations, an investigation was begun into the administration of the four state directors of health, physical education, and recreation serving Alabama since 1920. Important events and trends occuring within each administration were recorded. Studies were also made regarding courses of study and laws pertaining to the field. It is indicated that Alabama has made many contributions to the development of health, physical education, recreation, and athletics throughout the United States; that many health, physical education, and athletic innovations occured in Alabama; and that many national leaders have come from the state. Although many weaknesses exist, there is an abundance of facts pointing to greatly improved health, physical education, and athletic programs in Alabama. Four outstanding needs requiring attention are: (1) better health education programs; (2) development of elementary physical education programs which at the present time are almost non-existent; (3) cooperation between school and community in regard to programs of health, physical education, and recreation; and (4) improved professional attitude among health and physical educators. The study has made an effort to locate pictures of people and events and record them for the future. Eighty-two such pictures were used in the project. Investigation indicates that health, physical education, and athletic organizations have played dominant roles in providing guidelines and leadership for program development. Evidence, however, points out that severe gaps exist between the professional ideals of organizations and popular practice of administrators. Philosophy and practice in many ways are unrelated.

James E. Sharman
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University of Alabama in Birmingham
Birmingham, Alabama

April 4, 1970
2:30 p.m.

THE OVERARM THROW IN POORLY SKILLED COLLEGE WOMEN. Anne L. Rothstein, Herbert H. Lehman College.

The purpose of this study was to observe the overarm throwing pattern of women who exhibited poor technique. Subjects were selected from a group of fifty women students. The criteria for selection was the use of an overarm throwing pattern in the use of the body, the arm, the hand, and the wrist. Eight subjects were selected for filming. A Bolex H-16 movie camera (reflex) was used and the film speed was 64 fps. The subjects were asked to throw tennis balls at a target ninety feet away. The subjects were then rated according to a classification system proposed by F. Singer. This system classified the sequence of movements in the overarm throw. For four of the women, the pattern of the throw was described in detail. On the basis of the observations several hypotheses were suggested which might account for the patterns observed. According to a study by Wild, which described the development of the throwing pattern in children, the subjects appeared to be at an arrested stage of development. Was this related to a lack of ability or a lack of experience? It was suggested that the use of large balls, such as those used in elementary schools, to the exclusion of balls which could be held and thrown with one hand, might have led to the use of the pushing pattern observed. In this case one might say that the pattern observed was learned. Suggestions for future research included the recommendation that an experiment be conducted to test the hypothesis that the size of a ball would effect the overarm pattern used in throwing a ball.

April 4, 1970
1:00 p.m.

Anne L. Rothstein
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THE RELATIONSHIP OF ELECTROMYOGRAPHY AND PERFORMANCE PHENOMENA INVOLVED IN ARRESTING ERRORS IN MOVEMENT. Joseph R. Higgins, Teachers College, Columbia University.

Electromyographic recordings were viewed in relation to measures of limb displacement and limb velocity for correct and incorrect moves during performance on a step-function tracking task. Four Ss were tested on a series of 224 moves in response to step-function displacements of a horizontal line displayed on an oscilloscope. Muscle action potentials were detected at the surface of the skin by means of paired electrodes over the pectoralis major and the infraspinatus muscles. Muscle action potentials, stimulus signal, limb displacement and velocity were simultaneously recorded and measured. Following stimulus presentation for each move, latency of EMG and limb displacement was determined for correct and incorrect responses. Both the latency of onset and duration of activity were described in relation to the initiation and arresting of limb displacement (peak velocity). The findings revealed an apparent relationship between the appearance of reciprocal inhibition and the rapidity with which incorrect responses were corrected. Rapid corrective responses appeared to be associated with EMG records exhibiting good reciprocal inhibition. When an incorrect response exhibited reciprocal inhibition early in performance, it was associated with a corrective response of shorter duration than Ss previously determined proprioceptive reaction time. During later stages of performance, when corrective responses were below the Ss proprioceptive reaction time, the bursts of muscular contraction were of both shorter duration and higher amplitude and were followed by clear silent periods of longer duration than found in earlier stages of performance. Correct responses which exhibited reciprocal inhibition appeared to be associated with rapid target acquisition and minimal intermittent tracking behavior. The findings suggest that EMG may reveal trends in learning during performance of a step-function tracking task.

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April 4, 1970
1:15 p.m.

THE EFFECT OF LOW LEVEL MUSCLE ACTION POTENTIALS UPON THE MEASUREMENT OF JOINT STIFFNESS. Elizabeth A. Chapman, Robert Swezey, Herbert A. deVries, University of Southern California.

A new method of assessing joint stiffness has been recently developed by Wright and Johns. Their method involves measuring the torque and energy requirements necessary to oscillate a relaxed body segment about its joint axis. This method has advantages over traditional joint motion studies in that it is easily quantified and it assesses the dynamic aspect of joint motion i.e., joint stiffness. This methodology was adapted for use in the following research project. The purpose of this study was to examine the possible effects of low level muscle activity upon the measurement of joint stiffness. Previous investigators studying this question have not used electromyographic equipment sensitive enough to detect the lower levels of muscle action potentials (MAPs). The right index finger was oscillated at one cycle per second through a fixed arc of sixty degrees by a motor driven lever to which a strain gauge and potentiometer were bonded. From these, the torque and displacement were transmitted to a cathode ray oscilloscope and displayed on an X-Y plot. Pictures were taken of the graphs for permanent record. MAP monitoring was accomplished by integrated potentials from the extrinsic and intrinsic flexors and extensors of the index finger, recorded as uv RMS. Five subjects were tested at six low levels of MAPs using audio and visual feedback information to attain these levels. The MAPs at each level were then correlated with both the torque and energy requirement necessary at that level. The correlations ranged from .58 to .98 with the majority above the .90 level. Residual muscular tension below the levels detectable by previous investigators could indeed account for some of the joint stiffness apparent in certain individuals.

This work was supported by trainee funds from the University of Southern California Gerontology Center, NICHD Grant #HD-00157-03.

April 4, 1970
1:30 p.m.

Elizabeth A. Chapman
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THE GENERALITY OF THE EFFICIENCY OF ELECTRICAL ACTIVITY (EEA)

Steven J. Evans and Herbert A. deVries, University of Southern California.

The purpose of this investigation was to determine the generality (muscle to muscle within one subject) of the efficiency of electrical activity (EEA). In our laboratory the EEA was defined as: EEA = 1/m x 100, where m was the slope coefficient of the regression line calculated when the integrated electromyogram (IEMG) in microvolts (uv) root mean square (RMS) was plotted as a function of contraction in a series of submaximal isometric contractions. The use of the EEA concept in evaluating the "goodness" of muscle tissue function for physical education purposes could be considerably facilitated by the ability to predict the general level from measurements on one of several muscles. The IEMG was used to determine the EEA, and a hydraulic dynamometer connected to a dead weight tester was used to determine the force of isometric contraction. Sixteen female subjects were tested on eight appendicular muscle groups for EEA. Results. A multiple regression analysis performed on the EEA measurements, using one muscle as a predictor of the EEA in the remaining muscles tested, gave the following results: elbow extensors, R = .86 (F = 3.5), elbow flexors, R = .60, knee flexors, R = .57, knee extensors, R = .75, wrist plantar flexors, R = .73, ankle dorsal flexors, R = .82, and ankle plantar flexors, R = .85. Conclusions. 1. The efficiency of electrical activity (EEA) appears to be very general in nature as all muscle groups tested contributed in a positive manner to the multiple correlations. 2. Three muscle groups, the elbow flexors, ankle dorsal flexors, and the ankle plantar flexors, emerged individually, as good predictors of the degree of EEA present in the remaining muscle groups. 3. The level of generality found suggests that EEA, which is related to muscle hypertrophy, is of genotypic origin, but can be altered, to a lesser degree, by the phenotype.

April 4, 1970
1:45 p.m.

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A QUASI-DYNAMIC SIMULATION OF PARALLEL SKI TURN INITIATION.
K. C. Eyraud, Southern Oregon College; A. Seireg, University of Wisconsin.

This study was intended to investigate the nature of the forces applied on the skis for the initiation of a parallel turn. A quasi-dynamic simulation of body action was performed utilizing an instrumented platform capable of monitoring all forces and moments applied to it. A French style parallel turn was simulated on the platform. The recorded data provided quantitative information on the history of the vertical forces, the turning moment, and the position of the center of support during the simulated act. The data were highly reproducible and their pattern provided insight into the analysis of the act. The experimental results obtained from the platform gave a quantitative illustration of the correspondence between the quasi-dynamic act and the theoretical descriptions of the turning act. The sequence of weighting, unweighting, planting the pole, and changes of body postures were quantified by the test records. The study illustrated the importance of phase coordination between the vertical force pattern, shift of the center of mass, and twisting moments in turn initiation. This investigation provided a first step towards basic understanding of the mechanics of turning.

The paper is based on a thesis submitted in partial fulfillment of the requirements of the M.S. degree at the University of Wisconsin, Madison, under the direction of Elizabeth M. Roberts and Ali H. Seirig.

April 4, 1970
2:00 p.m.

K. C. Eyraud
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A DEVICE FOR PRODUCING PREDICTABLE CURVILINEAR MOTION. Marion L. Noble, University of Texas at Austin.

A ball track which described a path known as a helix of a right circular cylinder ($X = r \cos \theta$, $Y = r \sin \theta$, $Z = b \theta$) was constructed to produce predictable curvilinear movement. When a ball was allowed to roll down the track, its position, distance traversed, elapsed time from start, acceleration, and velocity at any point could be computed mathematically. The ability of the device to produce consistent movement was demonstrated by utilizing a six-volt timing circuit to determine the time taken for the ball to roll down the track. This same circuit was also used to automatically start the ball. One hundred trials were timed in this manner. The observations had a range of .005 seconds and a standard deviation of .0026 seconds. This device has possibilities for use when a motion whose parameters are known is needed to determine the validity of various cinematographic equipment and procedures, or for use in comparing the accuracy of various cinematographic equipment and procedures.

April 4, 1970
2:15 p.m.

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RELIABILITY OF CONSTANT ERROR AND WITHIN-INDIVIDUAL VARIABILITY FOR KINESTHETICALLY MONITORED FORCE REPRODUCTION. Mary Lou Norrie, University of California.

In the measurement of sensory discrimination ability, the variability of a subject's performance in reproducing a standard stimulus can be assumed to measure his difference limen (i.e., just noticeable difference). Hence, this variability measure becomes a measure of a subject's sensitivity. A large variability score, j.n.d., indicates a lower degree of sensitivity than a small variability score. Since one may wish to use a measure of kinesthetic sensitivity for prediction purposes the reliability of within-individual variability becomes crucial. The present study investigates the reliability of within-individual variability for a force reproduction task. In addition, although moderate to high within day reliability has been found for constant error on such a task, the between day reliability is not known. Sixty college women volunteers performed on each of two days eight trials of a kinesthetically monitored force reproduction task. The amount of movement of the handle of the apparatus during performance was minimal to avoid contamination of judgment with extent of movement. The reliability of constant error and within-individual variability, the latter a measure of kinesthetic sensitivity, were studied both within and between days. Within-day reliability of constant error was moderate (ranged from .664 to .855). Between-day reliability was .730 using all eight trials for each day and ranged from .487 to .702 using blocks of four trials as had been used in previous studies. Reliability of within-individual variability was low. Between days using eight trials for each day was .370. Using blocks of four trials the reliabilities ranged from .048 to .451. In conclusion, between-day reliability for constant error in a force reproduction task is moderate to fairly substantial. However, the proportion of individual differences is low for within-individual variability, both within days and between days.

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April 4, 1970
2:30 p.m.

A TOOL FOR EVALUATION PERFORMANCES OF MOVEMENT EDUCATION TASKS. Margaret J. Safrit, University of Wisconsin-Milwaukee; Margaret J. Deelman, University of Exeter; Peggy A. Chapman, Madison Public Schools.

An evaluation instrument has been developed as a research tool to assess performances of movement education tasks. The evaluation tool is designed to be used with filmed responses to movement tasks. A series of charts were formulated based on criteria reflecting components of a movement education program. Within each chart, rating scales were determined, and each category of the rating scale was defined in terms of observable behavior. Procedure. Three tasks, one of each movement content area, were developed in the initial attempt to apply the evaluation instrument. The purpose of Task I was to obtain responses on ability to balance; Task II, on use of level; and Task III, on use of time. In the initial study, 96 children were filmed. Two groups of 24 first grade children and 24 fourth grade children were from Exeter, Devon, England. Two other groups of corresponding ages were from Madison, Wisconsin. Summary. The first stage of the development of the tool was to determine its appropriateness for evaluating responses to several filmed movement tasks. Since the tool was designed to measure specifically defined content areas of movement education, content validity was claimed. Further evidence of validity will be established by examining age differences and differences between English and American children. Reliability and objectivity have been determined for one age group. Ultimately, however, basic movement must be viewed as a construct; thus, the evaluation tool must in the final analysis have construct validity. Future research on the tool will be directed to this end.

April 4, 1970
2:45 p.m.

Margaret J. Safrit
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COLD WATER APPLICATION EFFECTS ON RESPONSES TO HEAT STRESS DURING EXERCISE. Harold B. Falls, L. Dennis Humphrey, Southwest Missouri State College.

This study investigated the effect of partial body cooling (cold towels and showers) on the responses to heat stress during exercise. After a short acclimatization period, 6 subjects rode a Monark Bicycle Ergometer for 59 minutes alternating 5 minutes work with 1 minute rest in a hot environment (105° F dry bulb, 83° F wet bulb). Heart rate, rectal temperature, and sweat loss were measured and plotted for three experimental conditions -- C-control; E_1 - cold towel application (33.8° F) to abdomen and head during the rest periods; and E_2 - same as E_1 except for a pre-exercise 10 minute cold shower at 58.6° F. The data were statistically analyzed by analysis of variance and Student-Newman-Keuls Test. Results showed significantly lower heart rates, rectal temperatures, and sweat losses for E_1 and E_2 when compared with C. Sweat loss for E_2 was significantly less than for E_1. It was concluded that partial body cooling by the type of applications investigated can aid in the reduction of heat stress by enhancing the heat dissipating mechanisms of the body. Cold towels applied to the abdomen and head periodically during the exercise period apparently aid in cooling the blood and help in conduction of heat from the body surface. Taking a cold shower prior to the exercise period evidently sets up a situation wherein the heat can be conducted more rapidly from the core to the towels when they are applied.

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April 4, 1970
3:00 p.m.

THE RELATIONSHIPS OF SELECTED BODY TEMPERATURES TO SWEATING RATES OVERLYING ACTIVE AND NONACTIVE MUSCLES. Christine L. Wells, Dalhousie University, Elsworth R. Buskirk, Pennsylvania State University.

The regulation of sweat secretion on skin surfaces overlying active and nonactive muscle tissue was studied. Relationships among regional sweating rates (SR), skin (Ts), and subcutaneous temperatures (Tsub), and 3 core temperatures were examined to evaluate the possibility that a local heating effect resulting from exercise enhances sweat secretion. Two lean and two obese women performed contralateral arm-leg exercise representing 25% and 50% of their maximum $\dot{V}O_2$. Two environmental conditions (21.1 C and 29.4 C, ET) were selected to represent a neutral and a warm environment respectively. Ts values were obtained with copper-constantan thermocouples applied directly to 6 skin sites. Tympanic membrane temperature was obtained by insertion of a thermocouple into the outer ear. Esophageal temperature was measured with a catheterized thermocouple inserted through the nose and swallowed. A thermistor probe was utilized to obtain rectal temperature. Tsub was measured with thermistors embedded in surgical steel needles inserted so that the thermistor bead lay directly over the surface of the limb musculature. Regional SRs were obtained by passing dry air through plastic capsules applied to the skin surface, and then drawing the wetted air through thermal conductivity cells. Regional Ts, Tsub, and SR values were obtained overlying the quadriceps femoris muscle of each leg and the triceps brachii muscle of each arm. Core temperatures, Tsub, and SR increased during work performed at each ET. Ts was related to ambient temperature, but decreased with higher work load performance at each environmental temperature. Active limb Ts, Tsub, and SR exceeded nonactive limb values. Mean arm Tsub exceeded mean leg Tsub, but mean leg SR values were greater than arm values. Positive relationships were obtained between limb SRs and Ts, Tsub-Ts, and core temperatures. Because different relationships were found between SR and Ts, and Tsub-Ts for each work level performed, the concept of sudomotor regulation moderated by thermal receptors located at various depths in the skin was ruled out. The most reasonable afferent control signal seemed to be one originating from receptors located within or near muscle tissue. It was concluded that a local heating effect resulting from muscle contraction enhances localized sweat secretion. (This investigation was supported by PHS Grant No. AM 08311 from the National Institute of Arthritis and Metabolic Diseases).

Christine L. Wells, Ph.D.
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April 4, 1970
3:15 p.m.

AN ELECTRODIAGNOSTIC INVESTIGATION OF EFFECTS OF VARIED TEMPERATURE AND EXERCISE UPON IRRITABILITY, EXCITABILITY, AND STRENGTH IN THE BICEPS BRACHII*. Larry Thirstrup, Fort Hays Kansas State College.

This study was designed to investigate the effects of applied heat, applied cold, and isotonic-type exercise on the irritability, excitability, and strength levels of the biceps brachii muscle. Twenty-four male university students served as subjects for tne study. These subjects were assigned one of 24 permutations for receiving the three treatments (heat, cold, and exercise warm-up) and controlled rest. All subjects were required to complete four laboratory sessions, allowing only one session per week. Muscle irritability was measured in milliamperes and excitability in milliseconds through use of a Teca Chronaximeter and Variable Pulse Generator. Isometric strength was measured through use of an aircraft cable tensiometer. At each session the subject was tested for irritability, excitability, and strength. Following the strength trials the treatment scheduled for that session was then given. After receiving the appropriate treatment the subject was tested again for irritability, excitability, and strength in the same manner. The statistical techniques of analysis of variance, Duncan Multiple Range Test, Pearson product-moment correlation, and t- ratio were used to analyze the data. Upon the basis of this study, the following results were obtained: the irritability of the biceps brachii muscle was significantly lessened by applied heat; the excitability of the biceps brachii muscle was significantly decreased following the application of cold; strength of the elbow flexor muscles was not significantly changed as a result of applied heat or applied cold but was decreased by warm-up exercise; the experimental equipment and techniques employed for measuring irritability and strength in this study were as reliable or more reliable than those employed in previous studies.

*This study was completed at the Physical Education Research Laboratory, University of Texas at Austin, January, 1969, under the sponsorship of Lynn W. McCraw.

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April 4, 1970
3:30 p.m.

RELATIONSHIPS BETWEEN OBJECTIVE MEASUREMENTS AND SUBJECTIVE AWARENESS IN FOURTH GRADE CHILDREN. Jan Broekhoff, The University of Toledo.

This investigation is part of the "Toledo Growth Study," a longitudinal research project into the growth characteristics of elementary school children. The purpose was to determine the relationships between the actual standing of fourth grade boys and girls with respect to selected anthropometric and performance measures and their subjective ratings in these measures. The subjects were 82 boys and 81 girls, making up six self-contained, fourth grade classes in three schools from the Toledo area. After being tested, the children ranked themselves in their own class for standing height, body weight, grip strength, cable tension strength, and the standing broad jump. Rank-difference correlations were computed for the objective measurements and the subjective ratings in the experimental variables for each class. The resulting correlations for standing height were indicative of a moderately high, positive relationship between subjective and objective ratings; the coefficients clustered around .70. The correlations for body weight were in the same direction but lower than those for standing height. With the exception of one, they were statistically significant ($P < .05$). For the two strength measures and the standing broad jump low positive relationships were observed between subjective and objective ratings. Only half of the coefficients, however, reached the .05 level of significance. Chi-squares, computed from 2x2 fold contingency tables, indicated that there was a significant tendency for the boys to overrate and for the girls to underrate their performance in the two strength tests and the standing broad jump. This trend was not observed for the two anthropometric measures. In conclusion it can be stated that of the variables height and weight the former is more "visible," and that the boys and girls in this study had a more accurate idea of it. In the areas of static strength and the standing broad jump there was only a low awareness of accurate standing. It was here that boys and girls tended to rate themselves partly on the basis of social expectations in which boys are considered to be stronger than girls.

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April 4, 1970
3:45 p.m.

CHANGES IN STUDENT CLINICIAN'S SELF-PERCEPTION AFTER WORKING WITH HANDICAPPED CHILDREN. William C. Chasey, The University of Texas at Austin.

This study was conducted to measure change and the direction of change in self-concept of college student clinicians during an eight-week Physical Developmental Clinic for the Handicapped. The subjects selected for this study were thirty college students who volunteered to serve as student clinicians for a Physical Developmental Clinic for the Handicapped during the 1968 spring semester. Student clinicians worked the entire eight-week session with the same handicapped child. A wide variety of gymnasium activities, conditioning and coordination exercises, gymnastics, games and modified sports were utilized by the clinicians in their pursuit of specific fitness-coordination objectives. The clinic children possessed a variety of handicaps which included: obesity, faulty vision, emotional disturbance, mental retardation, and orthopedic difficulties. Thirty student clinicians were given the Fiedler Interpersonal Perception Scale at the beginning and at the end of the eight weeks of working with handicapped children. In terms of frequency and percentages, it was observed that three clinicians (ten per cent of population) viewed themselves with less favor at the completion than at the beginning. Five (17 per cent of the population) were unchanged; while twenty-two (73 per cent of the population) demonstrated a more favorable perception of self at the completion of the clinic. Means of pretest and posttest scores were compared by use of a t-Test, resulting in a t value significant at the .01 level and indicating that for the population as a whole, the clinic experience resulted in more favorable self-perceptions.

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April 4, 1970
4:00 p.m.

RELATIONSHIPS AMONG MEMBER, TEAM, AND SITUATIONAL VARIABLES AND BASKETBALL TEAM SUCCESS: A SOCIAL PSYCHOLOGICAL INQUIRY. Lee Vander Velden, University of Maryland.

The purpose of this study was to explain the effectiveness of sports teams in terms of their social psychological attributes and situational conditions. An attempt was made to determine both the nature and degree of the relationships among certain characteristics of high school basketball teams, their social environment, and their effectiveness in organized competition. A special questionnaire was administered to team members and coaches from twenty-five senior high school basketball teams during the 1968-69 season. The questionnaires were completed at three points in time; prior to the season, after the first round of league competition, and after the season was completed. Data from team members were combined to form group measures for each team, the unit of analysis. Although the information obtained from each coach (the formal leader) was treated separately from team members' data, the relationships between members' data and the coach's data also provided measures of group behavior. Automatic interaction detection procedures and multiple regression techniques were used to explain the relationships among (a) member attributes (task ability, task experience, and task motivation); (b) team attributes (status consensus, formal and informal leadership, group atmosphere, and liking); and (c) situational factors (special population and tradition) and the dependent variable, team effectiveness. The findings showed that team effectiveness is a function of team members' task abilities and task experience, and team tradition. Group atmosphere and liking were directly related to team success while task motivation, status consensus, leadership, and the size of the school were not related to team effectiveness.

April 4, 1970
4:15 p.m.

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THE EFFECTS OF FORMAL STRUCTURE ON ORGANIZATIONAL LEADERSHIP: AN INVESTIGATION OF COLLEGIATE BASEBALL TEAMS. John N. Sage, University of California at Riverside; John W. Loy, University of Massachusetts.

The primary purpose of the investigation was to test the general proposition derived from Grusky's theory of formal organizational structure that high interactors are more likely to become leaders than low interactors. It was hypothesized that within collegiate baseball teams high interactors (infielders) are more likely to be selected as team captains than low interactors (outfielders). Postcard questionnaires (n = 493) were mailed to every other college with over 1,000 men listed in the Blue Book of College Athletics for 1968-69. Data were obtained concerning the playing positions of team captains for the 1967-68-69 seasons; and whether they were selected by players, coaches or a combination thereof. Chi-square analysis of 203 returns supported the general proposition that high interactors are more likely to be selected as formal leaders than low interactors. Alternative hypotheses are offered which might also account for the finding that infielders are more often selected as team captains than outfielders.

April 4, 1970
4:30 p.m.

John N. Sage
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EFFECT OF PRESENCE OF OTHERS, AND COOPERATION AND COMPETITION ON RISK TAKING. Glyn C. Roberts, Kent State University

Fifty hope for success (Ts) subjects and 50 failure avoidant (Tf) subjects were selected by means of the FTI and the TAQ and randomly placed into five groups: (1) alone (A); (2) the presence of four passive spectators (P); (3) competing against two others (CM); (4) cooperating with two others as a team while competing against another cooperating triad (COCM); (5)competing with two others on the same team while competing against another competing triad (CMCM). The task was a modified shuffleboard game. All subjects had 10 practice trials from each of eight distances. The 10 practice trials were used to establish probabilities of success at each distance for each subject. Subjects then freely chose the distances for 20 free-choice trials with knowledge of the probabilities of success. Risk taking measurement was based upon the chosen probabilities of success. Results indicated that Ts subjects selected intermediate risk to a significantly greater extent than Tf subjects across all treatments. The expected interaction between risk taking disposition and treatment for risk taking preferences did not materialize. However, greater inconsistency was demonstrated by A and CM subjects than P, COCM, or CMCM subjects. Tf subjects avoided intermediate risk as expected, but tended to favor extreme risk rather than conservative risk. The results of this investigation support Atkinson's risk taking theory when applied to a complex motor task.

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April 4, 1970
4:45 p.m.

GROUP COHESIVENESS AS A DETERMINANT OF SUCCESS AND MEMBER SATISFACTION IN TEAM PERFORMANCE. Rainer Martens and James A. Peterson, University of Illinois at Champaign-Urbana.

As one phase of a larger project investigating the antecedents and consequences of cohesiveness in sport groups, the present study determined if different levels of group cohesiveness affected the effectiveness and individual member satisfaction of intramural basketball teams. Over 1200 male college students, members of 144 basketball teams, responded to an instrument designed to measure cohesiveness. The teams participated in 24 leagues in three divisions based on their residential affiliation. The questionnaire assessed various components of cohesiveness such as interpersonal attraction and power, and also asked for members' direct evaluations of the group's teamwork and closeness. The number of games won determined team effectiveness, while a post-season questionnaire assessed the degree of individual member satisfaction. Teams were categorized into low, moderate, and high levels of cohesiveness for each of eight measures of cohesiveness. Eight one-way analyses of variance determined team effectiveness, while 3 X 3 analyses of variance (three levels of cohesiveness and three residential organizations) determined member satisfaction. Results showed that assessing various components of cohesiveness did not differentiate between winning and losing teams. However, when directly asked about the cohesiveness of the team, high cohesive teams won significantly more games than moderate or low cohesive teams. Seven of the eight measures of cohesiveness indicated that high cohesive teams were significantly more satisfied with their participation than moderate and low cohesive teams.

Supported by U.S.P.H.S. grant MH-07346 and D.M.H. grant 9424.

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April 4, 1970
5:00 p.m.

PERSONALITY CHARACTERISTICS OF FEMALE HIGH SCHOOL ATHLETES AND NONPARTICIPANTS IN ATHLETICS. Sharon L. Kelley, Luther College; Mildren J. Barnes, University of Iowa.

The purpose of the study was to determine if personality differences exist between female athletes and female nonparticipants in athletics on the high school level. Sub-problems of the study were: (a) to determine if similarities and/or differences exist among female high school athletic groups participating in basketball, softball, golf, and track and field; and (b) to ascertain if differences exist between female high school athletes participating in individual sports and those athletes participating in team sports. The subjects included 209 high school athletes and 206 nonparticipants in athletics. The California Psychological Inventory was used as the measuring device. The t-test of significance of difference was used to compare the means of female high school athletes and nonparticipants in athletics on personality variables as well as comparing the means of female athletes in individual sports with female athletes in team sports. Analysis of variance was used to determine personality differences among female high school athletes participating in golf, track and field, basketball, and softball. Results showed that the high school athletes were significantly higher than nonparticipants in athletics at the .01 level on measures of poise, ascendancy, and self-assurance; and specifically on traits of sociability and self-acceptance at the .01 level and on traits of dominance, sense of well-being, and socialization at the .05 level. The nonparticipants in athletics were significantly higher than the athletes on measures of intellectual and interest modes at the .01 level and on the femininity trait at the .01 level. Athletes in individual sports scored significantly higher than those athletes in team sports on measures of poise, ascendancy, and self-assurance; and specifically on traits of dominance, capacity for status, and social presence at the .05 level and on traits of sociability and self-acceptance at the .01 level.

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April 4, 1970
5:15 p.m.

RELATIONSHIPS BETWEEN SELECTED PERSONALITY CHARACTERISTICS AND THREE SPORT-ENVIRONMENT VARIABLES. Bonnie G. Berger, Teachers College, Columbia University.

Three environmental variables present in sport were hypothesized to be related to personality differences of athletes participating in various sports. Environmental characteristics selected for investigation were: (1) Nature of Competition; (2) Probability of Physical Harm; and (3) Temporal-Spatial Uncertainty. Three levels within Nature of Competition were competition directly against an opponent, in parallel against several opponents, and indirectly against opponents. The two levels of Probability of Physical Harm were derived from accident statistics based upon extent and frequency of injury in various sports. Temporal-Spatial Uncertainty had two levels: certain and uncertain. Seventeen personality characteristics measured by pencil and paper tests were aggression, guilt over aggression, dominance, extropunitiveness, intropunitiveness, need for order, need for change, tolerance of ambivalence, tolerance of ambiguity, tolerance of unrealistic experience, the three preceding scales combined, extroversion-introversion, hypochondriasis, narcissism, augmenters-reducers, test-taking attitude, and neuroticism. One hundred and thirty-four male varsity athletes attending Yale, Harvard, and Cornell Universities during the 1968-69 academic year served as Ss. Separate analyses of variance were performed for each personality characteristic. Random group factorial designs were employed to evaluate observed personality differences between athletic groups classified according to the three environmental variables. Simple comparisons were performed for the main effects significant at the pre-established .05 level. Significant differences between athletes grouped according to Probability of Physical Harm were observed on three scales: need for change, hostility guilt, and hypochondriasis. Athletes scoring highest in agression were participants in sports characterized by indirect competition. Participants in high harm sports scored higher on a need for change and hypochondriasis. Apparently variety-seeking athletes were willing to place themselves in a high harm environment; their high scores on hypochondriasis might reflect awareness of harm probability and the accompanying requirement that they be in prime physical condition in order to avoid physical injury. Athletes participating in the low harm sports scored significantly higher on hostility guilt. Perhaps their choice of low harm sports reflected their preferences to avoid the possibility of injuring an opponent.

Bonnie G. Berger
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April 4, 1970
5:30 p.m.

ACUTE PSYCHOLOGICAL EFFECT OF PHYSICAL ACTIVITY.* William P. Morgan and John A. Roberts, University of Missouri, Columbia.

The present report involves two experiments which were conducted for the purpose of assessing selected psychological concomitants of moderate and strenuous physical activity. In the first investigation, 120 male professors were randomly assigned to either a treadmill (N=60) or bicycle ergometer (N=60) exercise task. The Ss within groups were randomly assigned to exercise conditions which would evoke terminal heart rates of 150, 160, 170, or 180 beats per minute. Hence, there were four treadmill groups and four bicycle ergometer groups comprised of 15 Ss each. A five minute recovery EKG was performed, and the S then completed Form A of the Depression Adjective Check List. Group differences were evaluated with the Kruskal-Wallis ANOVA and the Mann-Whitney U test where appropriate. While exercise intensity within groups did not affect levels of depression, the treadmill group scored significantly lower than the ergometer group on the depression variable for the heart rate response of 160. In a second experiment, female students (N=18) and male students (N=18) were randomly assigned to either a 1-mile treadmill walk at (i) 3.5 mph and 0% grade, (ii) 3.5 mph and 5% grade, or (iii) control treatment (supine rest). That is, there were three groups of females and three groups of males each containing 6 Ss. Form A of the 8-Parallel-Form IPAT Anxiety Battery and Form A of the Depression Adjective Check List were administered to all Ss immediately following the various treatments. The significance of differences for the three female groups was evaluated with the Kruskal-Wallis ANOVA. The same analysis was performed on the three male groups as well. In addition, differences between male and female groups were assessed with the Mann-Whitney U test. Physical activity did not affect anxiety or depression levels, nor did the females and males differ on these variables following the respective treatments. It is concluded that physical activity of the type employed in these investigations does not elevate or decrease either anxiety or depression in "normal" Ss. Since the treadmill and bicycle ergometer groups differed significantly at one work intensity, it is recommended that the relative merits of these exercise devices be further explored from the standpoint of evoked psychic states. *This research was supported in part by a grant from the Research Council, University of Missouri, Columbia.

William P. Morgan
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April 4, 1970
5:45 p.m.

A CROSS SECTIONAL STUDY OF THE PERSONALITY FACTORS OF GIRLS AND WOMEN IN COMPETITIVE LACROSSE. Carole L. Mushier, California State Polytechnic College.

A stratified random sample was drawn from the total competitive population at the junior high school (JHS), senior high school (SHS), college, association and national levels. The appropriate personality questionnaire (HSPQ or 16PF), Form A, was administered to all subjects. Each of the six samples was compared on all factors. Findings of the study included: (1) The JHS sample was more intelligent, assertive, happy-go-lucky, and circumspect than its norm; (2) The SHS sample was more reserved, intelligent, assertive, happy-go-lucky, expedient, toughminded, suspicious, forthright, experimenting, undisciplined, and tense than its norm; (3) The college sample was more intelligent, assertive, happy-go-lucky, expedient, toughminded, suspicious, forthright, and experimenting than its norm; (4) The association bottom four team sample was more reserved, intelligent, assertive, happy-go-lucky, toughminded, suspicious, forthright, and experimenting than its norm; (5) The association top four team sample was more reserved, intelligent, and expedient than its norm; (6) The national team sample was more reserved, intelligent, happy-go-lucky, shy, toughminded, and experimenting than its norm; (7) The samples differed from each other on six factors: intelligence, conscientiousness, self-assurance, control, tenseness, and forthrightedness. No pattern of differences was found between pairs or selected groups of samples. Within the limitations of the study, it was concluded that: (1) each sample was significantly different from its norm on more than one factor. (2) The hypothesis that the lower the age level of the sample, and the less their experience in the competitive aspects of the sport, the less the number of significant differences between the sample and the norm was not supported by the analysis of data. No regular pattern of number of differences from norms was established. (3) The total competitive lacrosse group was characterized as more reserved, intelligent, assertive, happy-go-lucky, toughminded, and experimenting than the norm. (4) There were differences between sample groups on six factors, only one of which was a common factor of difference from the norm for most samples. No pattern of differences was found on the significant factors. (5) This study also suggests that personality development may be independent of competitive sports participation; that self selection of the individual into competitive sports may be determined by personality factors that the individual already possesses.

Carole L. Mushier
Physical Education Department
California State Polytechnic College
Pomona, California

April 4, 1970
6:00 p.m.

AN EXPERIMENT IN TEACHING COMPLEX MOTOR SKILLS TO UNIVERSITY FRESHMAN MALE STUDENTS USING CONTINUOUS AND DISCRETE CONCEPT SEQUENCES WITH AND WITHOUT INSTANT VIDEOTAPE REPLAY.

Kenneth M. Cox, Wisconsin State University.

The experimenter (E) investigated two instructional strategies designed to teach complex motor skills to university freshman male subjects (Ss) with high and low physical achievement as measured by the AAHPER-PFT. One hundred forty Ss were randomly selected from the freshman male population, University of Washington. Using random numbers the Ss were equally divided into four beginning physical education wrestling classes. The length of the experiment was 11 weeks with each class meeting twice weekly for periods of 45 minutes. All Ss were taught the same 75 complex motor skills. A wrestling performance skills test (PST) designed by the E was employed to analyze the Ss ability to perform complex motor skills. Analysis of variance was used to analyze scores on the wrestling PST. Levels of significance were established at $p \leq .05$. Within each treatment condition, data were analyzed according to the presence or absence of instant videotape replay (IVTR) and the level of physical achievement. This resulted in a 2x2x2 factorial experiment with a randomized group design. There were no significant differences in the performance of wrestling skills between the treatment groups. The treatment effects were partitioned into three main effects of the factors and four interactions between the factors. The first main effect showed no significant differences between the treatment groups receiving continuous concept sequencing and those receiving discrete sequencing. Similarly, the second main effect revealed no significant differences between treatment groups taught with and without IVTR. The third main effect, the physical achievement variable, was significant at .01 level of confidence. In terms of the PST, Ss identified as possessing a high level of physical achievement performed significantly better than Ss identified as low physical achievers. It may be concluded that Ss taught by the continuous concept sequence strategy did not perform significantly different on a PST than did Ss taught by the discrete concept sequence strategy. Also, the use of IVTR had no significant effect in stimulating Ss learning. Results revealed the level of physical achievement to be a significant factor in influencing Ss performance.

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April 5, 1970
10:45 a.m.

THE RELATIVE EFFECTIVENESS OF PERSONAL AND TELEVISED INSTRUCTION IN BODY CONDITIONING. Martha K. Nicholson, Romeo, Michigan High School; Barbara Milacek, University of Washington.

The purpose of this study was to determine the relative effectiveness of body conditioning instruction of college women when presented personally by the teacher and when presented by instructional television. The ninety-five subjects were enrolled in four body conditioning classes during Autumn Quarter, 1968, at the University of Washington. Two control groups received instruction personally from one of two master teachers involved in the study. Two experimental groups received instruction via a television tape of a master teacher who had personally instructed one of the other groups. An arm and shoulder girdle strength test; an abdominal strength test; a cardiovascular endurance test; and a lower back, hip, and leg flexibility test were administered to all subjects before and after the nine week instructional unit. A knowledge examination was administered following the instructional unit. Analysis of variance was used to examine the differerences among group means, and when a significant F was found, the differences were then tested for significance by use of the "t" test. Following the instructional unit the subjects were asked to evaluate the course and methed of instructional presentation. Although the experimental subjects indicated a preference for personal rather than televised instruction, the results of the physical fitness tests and the knowledge examination indicated that instructional television in a physical education body conditioning class can be effective.

April 5, 1970
11:00 a.m.

Martha K. Nicholson
Physical Education Department
Romeo High School
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THE EFFECT OF THREE TEACHING METHODS IN GOLF ON ACHIEVEMENT OF LEARNERS WITH DIFFERENTIAL SKILL IN A RELATED TASK. Tonya Toole, University of Wisconsin.

The primary purpose of this study was to determine the effect of teaching cues focusing attention on different aspects of a full golf swing on achievement of learners selected on the basis of differential skill in the related task of batting. Subjects, ages 12 through 18 with no prior formal golf instruction, were randomly assigned to one of three teaching methods on the basis of sex and batting ability. Batting ball velocity was used as a measure of batting ability and, more specifically, as a measure of range of pelvic rotation in batting as determined by a pilot study. One method was based on the assumption that those with less skill in the related task of batting needed to attend directly to the similar body movements essential to skill in golf. In order for the learner to give direct attention to the movements deemed necessary for skill in the full golf swing, the total swing was divided into six phases. A second method focused attention on the effect of the weight of the clubhead through its arc on the continuity and acceleration of the swing. This method was based on the premise that for those who could adequately perform the body movements essential to skill in batting, attention to club movements pertaining to plane, range, and acceleration would be sufficient to elicit the requisite body movements which had been habituated in the related skill of batting. A third method combined aspects of the other two. At the completion of seven 60 minute lessons with a #5 iron, a 16mm Kodak Cine-Special camera recorded 64 frames per second for two full swings per subject with a #5 iron. Primary conclusions were: (1) Subjects with greater batting ability had significantly greater clubhead velocity and range of pelvic rotation in the golf swing than subjects with less batting ability. (2) Different golf teaching cues did not significantly differentiate achievement in either clubhead velocity or range of pelvic rotation among learners. However, for those with lower batting velocity, focusing attention directly on pelvic rotation in addition to club movement, effected a greater range of pelvic rotation than for those who attended to either pelvic movement or club movement. (3) Body movement and club movement cues had a comparable effect on the plane of the swing, the length of pause at the top of the backswing, and the ratio of downswing to backswing speed. (4) Although there was no significant difference in the effect of body or club movement teaching cues on achieving a straight left elbow at the top of the backswing, it appeared that attention to the action of the club enhanced extension of the left elbow.

Tonya Toole
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April 5, 1970
11:15 a.m.

THE EFFECTS OF ELECTRICAL STIMULATION ON THE PERFORMANCE OF A SELECTED GYMNASTIC SKILL, AN EXPLORATORY STUDY. Frank M. Powell, Georgetown College.

The purpose of this study was to determine the effects of electroshock on the performance of a selected gymnastic skill, the end bar kip on the parallel bars. A sub-purpose was to investigate the physiological changes in heart rate and muscle tension elicited by the shock before and during the skill performance. The 14 subjects used in the study were college students between the ages of 18 and 21. The subjects were matched equally through physical tests and placed into a control group and an experimental group. The two groups were equated on the basis of chin and pull-up strength, the Johnson Motor Educability Test, the Barrow Motor Ability Test, and a test of flexibility involving the lower back and hamstring muscles. The experimental group received an electrical shock stimulus through electrodes placed on the lower back. The control group received an audio cue in place of the shock. The experimental group made 297 attempts while the control group made 344 attempts. The subjects within the experimental group received the shock stimulus a total of 123 times. A statistical analysis of the total number of trials required to learn the skill revealed no significant difference in the two groups on the learning of the end bar kip on the parallel bars. The mean number of trials necessary to learn the skill, however, was 8 fewer in favor of the experimental group. Physiological data were recorded from 4 selected subjects, two from each group. Muscle tension as indicated by the sternocleidomastoid was 5 per cent higher in the electroshock situation than in the control situation. Subjects unaccustomed to the shock showed no detectable increase in muscle tension over the accustomed subjects but their resting heart rates were greatly elevated. It is assumed that an increase in muscle tension and heart rate associated with electroshock stimulation is an indication of the body's preparation to perform. The motivational qualities of electrical stimulation when used in a non-stress situation deserve more consideration in relation to complex motor skill learning. There seems, however, to be a place for electrical stimulation in the teaching of particular students who show deficiences in timing or speed and force of contraction.

Frank M. Powell
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April 5, 1970
11:30 a.m.

THE RELATIVE EFFECTIVENESS OF TWO APPROACHES TO THE TEACHING OF MOVEMENT FOR THE ACTOR. Thelma Ray Faulkner, Indiana University.

One approach, referred to as verbal, was devoted to instruction in mime and improvisations which permitted the use of the spoken word. The other approach, referred to as nonverbal, was devoted to instruction in selected movement techniques and improvisations which were primarily nonverbal in nature. The subjects were fourteen students enrolled in a beginning acting course at the Texas Woman's University, in Denton, Texas, during the academic year 1968-1969. The students were divided randomly into two groups and were exposed to one approach for six weeks and then to the other approach for an equal period of time. The acting performances of the subjects were evaluated by selected judges at the mid-point and conclusions of each six weeks period -- a total of four evaluations. The data collected were subjected to the Two Factor Mixed Design: Repeated Measures on One Factor to determine if there was significant difference in the two approaches at the conclusion of any one of the four evaluations. The investigator then selected Duncan's Multiple-Range Test and the t Test to establish if there was significant difference in the comparisons by two of the group means being considered. The general results were: (1) both groups showed improvement at the conclusion of the first instructional period; (2) there was no significant difference in the mean scores of the subjects for either of the two groups at the conclusions of the first instructional period; (3) a significant difference between the mean scores of the two groups existed at the mid-point of the second instructional period; (4) the significant difference in the mean scores of the two groups at the mid-point of the second instructional period indicated that the transfer of learning occurred from instruction in the verbal approach followed by the nonverbal approach was more desirable; (5) there were no significant differences in the mean scores of either of the two groups at the completion of the second instructional period; and (6) although not significantly different, the mean scores of the subjects exposed to the nonverbal instruction at the time of each of the four evaluations were slightly higher at the mid-point and conclusions of both of the instructional periods.

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April 5, 1970
11:45 a.m.

OXYGEN INCOME AND DEBT. Franklin M. Henry, Department of Physical Education, University of California.

To determine if oxygen debt cumulates or if there is debt payoff during a 12 minute work bout in which the rate of work declines because of fatigue, oxygen intake was measured by the open circuit method for consecutive one-minute periods during 12 minutes of bicycle ergometer work and continued for the first 10 minutes of recovery. Subjects were fifty young male volunteers from college physical education classes. Data were analyzed correlationally, and by t-tests and F-tests. Subjects were then placed in five groups of ten each, based on amount of work done. This work was performed initially at the rate of 1642 kgs-m/min., but dropped off 4% to 40% in the different groups because of fatigue. In this type of fatiguing work, the subjects with greatest work output have the highest aerobic capacity, but their oxygen income (4.2 L/min.) fails to meet the requirement (4.6 L/min.) and thus debt cumulates during the 12 minutes. Subjects with less work capacity (i.e. output during the test) perform within their aerobic capacity, and drop off to a work rate that permits income to balance requirement. Consequently, their post-exercise debt is less. Even though the oxygen requirement declines to well below aerobic capacity as a result of the drop off in rate of work, there is no appreciable payoff of oxygen debt during the work. (F. Katch and R. Girandola were co-investigators in the study.) Adjacent-minute reliability coefficients are high.

April 5, 1970
12:00 noon

Franklin M. Henry
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ORIGINS OF FACULTY ATTITUDES TOWARDS INTERCOLLEGIATE ATHLETICS: THE UNIVERSITY OF WISCONSIN - AN ILLUSTRATION; Michael D. Smith, University of Wisconsin.

The purpose of this study was to determine the role of the Faculty in the development of intercollegiate athletics at the University of Wisconsin during the period 1873 to 1925. Using the historical method of inquiry, the investigator identified and reviewed primary materials housed in the archives of the University of Wisconsin libraries. The following conclusions were drawn: (1) Four different periods occurred in the development of intercollegiate athletics during the years in question; (2) Closely connected with the above periods were Faculty attitudes of laissez-faire, bitter opposition, and helpless resignation; (3) Positions taken by the Faculty did not, except in the Football Reform Movement of 1906, substantially affect the development of intercollegiate athletics.

Michael D. Smith
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April 5, 1970
10:45 a.m.

PIERRE DE COUBERTIN AS A FRENCH PATRIOT. Richard D. Mandell, University of South Carolina.

Scholars have, like the aged Pierre de Coubertin himself, regretted that he was never awarded the Nobel Peace Prize. Coubertin was, in fact, a passionate patriot almost from his birth into an ancient, aristocratic family. At first, his international sporting congresses were intended to shame and inspire French participators and spectators. Frenchmen, he felt, had declined, since they, unlike Englishmen, had neglected the education of their bodies. Pierre gradually became estranged from his homeland as French Republicans ignored his proposals for educational reform. A crucial event was the Republic's bungling of his "Olympic Games" which bureaucrats hid as a tiny sub-section of the Paris Exposition of 1900. Eventually he awarded the sixth Olympiad to the Germans whom he had detested as a youth. Later he worked and died in Switzerland. A careful look at Coubertin's early writings may damage his reputation as a genius and a saint, but we must put the record straight.

April 5, 1970
11:00 a.m.

Richard D. Mandell
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University of South Carolina
Columbia, South Carolina 29208

AN ILLUSTRATED HISTORY OF THE RISE OF BASKETBALL FOR WOMEN IN COLLEGES. Ronald A. Smith, The Pennsylvania State University.

The history of basketball for women in colleges is nearly as old as that for men. In January, 1892, the first organized basketball game was played at the Y.M.C.A. Training School, Springfield, Massachusetts. Within the year women at Smith College had organized a team. Senda Berenson, a young physical educator at Smith, saw the need to change the rules of basketball which had been invented to serve the physical needs of men during the winter months between football and baseball. These rule changes influenced the direction of college women's basketball. Other modifications and control by women over basketball radically changed the game from the original invention of James Naismith. Through the early years of the twentieth century a movement to prohibit intercollegiate basketball, the most important of college women's sports, gained strength. By the 1930's the idea of the play day as a substitute for intercollegiate athletics was generally accepted by women physical educators. In the post-World War II era there was a gradual movement to incorporate aspects of men's basketball into the women's game. By the end of the 1960's, because of international and other pressures to change the rules, college women were experimenting with a game which in most important ways resembled once again that of men's basketball. The story of the rise of basketball for women in colleges tells something of the change in thinking concerning the amount of physical activity in which women should participate, the influence that men's intercollegiate athletics have had on women's athletics, and the direction taken by women's physical education. In sum, basketball for women in colleges first developed from a game organized for men. Rule changes were soon adopted in an effort to make the game applicable to the needs of women. Rule changes combined with an antipathy toward intercollegiate athletics by college women physical educators in the first generation of the twentieth century brought about a game quite different from that of man's basketball. By the 1950's and 1960's the game was returning to include more intercollegiate play with rules similar to those played by men.

April 5, 1970
11:15 a.m.

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TWENTIETH CENTURY CONCEPTS OF SPORTS COMPETITION FOR WOMEN. Mary L. Remley, University of Wisconsin.

The purpose of this study was to trace attitudes toward sports competition for college-age women in the United States during the twentieth century. A preliminary examination of the professional records and literature written by women in physical education (books, periodicals, Archives of the National Association for Physical Education of College Women and the Division for Girls and Women's Sports) suggested that major concepts were developed in the years following the appointment of the Women's Athletic Committee in 1917. However, a prologue is included to clarify concepts developed prior to 1917. From a critical analysis of the literature, five categories of concepts were established: concepts developed from terminology; concepts developed from recurring problems; concepts developed by individuals; concepts developed by organizations; and concepts developed from research. The study was organized around these categories, and the literature pertaining to each concept was analyzed and synthesized in an attempt to determine patterns of attitudes within each of three sub-periods. Within the limits of the study it was concluded that: 1. Women physical educators expressed ambivalent attitudes toward sports competition for women in the years from 1918 to 1968. While competition was promoted by some, it was decried by others. Still others supported competitive sports only when certain conditions were met. 2. In the early years attitudes may be described on a scale with extreme opinions on either end and diverse ideas between the two extremes. Disapproval of sports competition for women appeared to be more pronounced than approval. However, a shifting of emphasis occurred in later years; opinions seemed to be less extreme, but there was still no consensus. Thus, it appeared that the relative ambivalence of attitudes toward competition changed during the years under study. 3. While patterns of ambivalent attitudes were identified within each of the three sub-periods, these patterns were not substantially different from one period to the next. Patterns of approval, disapproval, and approval contingent upon certain conditions were found in all three periods.

Mary L. Remley
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April 5, 1970
11:30 a.m.

A PHILOSOPHICAL DESCRIPTION OF SPORT. R. Scott Kretchmar, Kansas State Teachers College

The purpose of this study was to describe fundamental experiences present in activities commonly called "sport". This analysis also intended to provide: (1) a greater appreciation of sport experiences; (2) a clearer understanding of differences between sport and non-sport, and; (3) increased knowledge of philosophical problems inherent in purely objective or subjective analyses. Results were obtained through reflection on personal participation in several sports. Numerous experiences were identified and listed. Attempts were made to group similar and recurring experiences. Ultimately, efforts were made to describe the similarities and to argue for the "necessity" of selected experiences over others. It was discovered that the fundamental experience of participation in sport activities can be divided into three perceptions. These elusive, lived experiences might be named opposition, intended movement, and absurdity. Opposition is the lived experience of tension, of pulling apart, of acting against. Intended movement is the feeling of directed or purposeful kinesthesis. It is the experience of movement being the primary or sole mediator between one's intentions and the objective sought. Absurdity is the experience of the arbitrary, the unnecessary, the freely chosen. Though other experiences, such as the feeling of working together in teamwork, can accompany the aforementioned parameters, they do not serve to alter the fundamental mood of activity. On the other hand, if one or more of the experiences called opposition, directed movement, or absurdity were absent, the whole perception becomes radically different. The common verbal symbols of "work", "games", and "philanthropy", for example, may point to such distinctions in lived experience. It was noted in this analysis that the extent of reduction to fundamental experiences is essentially arbitrary. For example, another study might differentiate between experience of contact and non-contact movements or team and individual activities. This study attempted to remain on a broader base in describing experiences which recur and adhere in many different sport environments. Advantages in this description were found over subjective analyses which have dual problems of avoiding relativism and explaining relationships between ideas and environment. This analysis also eliminated some problems inherent in objective definitions of sport--namely, a tendency to overlook the variety of experiences in activity; the inevitability of describing relationships between "things", and subsequently, relationships between relationships, ad infinitum; and errors of misjudging appearances.

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April 5, 1970
11:45 a.m.

MEANINGS FOUND IN THE ACTS OF SURFING AND SKIING. Roselyn E. Stone, University of Toronto.

The literature of surfing and skiing was searched and the data thus obtained subjected to analysis for the purpose of identifying and comparing the kinds and sources of meanings found within the acts of surfing and skiing. Data were experiential accounts of specific encounters with the act or generalizations about, or metaphorical expressions of, the experience of these acts. Meaning was equated with "recognized relatedness" with relatedness being the operation concept in the inductively developed analysis techniques. Two analyses were carried out: one, to sort the subject matter of each datum according to pre-established rubrics; the other, to scrutinize the nature and content of items found under each rubric. Three qualities of meaning were identified - functional, intellectually-laden, feeling-laden. The latter two were significant in determining sources of meaning. Conclusions: (1) The given phenomena of the acts of surfing and skiing are apprehended as phenomena of functional concern and intellectual/feeling interest. (2) The understandings derived from performers' reflections on the objects and events of skiing and surfing vary in their feeling content. (3) The sources of meaning in each of skiing and surfing reduce to these phenomena: the performer's phenomenal world, the self, competence, risk-taking, speed. (4) There are between-individual differences in the relatednesses found by performers to given sources of meaning within these acts. (5) The sources of meaning found in the act of surfing are similar to those found in the act of skiing when they relate to events within the performer, viz., the feeling state, and the experience of control, self, one's actions, danger, speed. They differ when they relate to his phenomenal world of wave and board, or of slope, trees and skiis.

April 5, 1970
12:00 noon

Roselyn E. Stone
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SCHOLARSHIP AND ATHLETICS IN JUNIOR HIGH SCHOOL. Hans G. Buhrmann, University of Lethbridge.

This longitudinal study examined the relationship between academic achievement and various measures of boys' participation in junior high school varsity athletics. The data were obtained from athletic ratings and school files of 158 boys, (74 athletes and 84 non-athletes) who attended two junior high schools in a Southern Oregon town of 25,000. Measures of athletic participation (amount, length, and quality of athletic involvement and popularity of varsity sports) constituted the independent variable. Academic achievement as the dependent variable was measured by grade point averages and standardized achievement tests (Iowa Test of Basic Skills and Iowa Test of Educational Development). Socio-economic status and previous grade achievement (8th grade G.P.A.) were classified as control variables. The non-parame ric Goodman and Kruskal Gamma was selected to analyze the data. After the initial analysis, athletes were individually matched with non-athletes on the control variables. In this study the hypothesis was advanced that athletic participation has a positive relationship to academic achievement. The results supported this hypothesis showing that athletes significantly surpass non-athletes in scholarship. Even when the influence of the control variables was held constant, this positive relationship as far as grade point averages were concerned, remained significantly in favor of the athletes. It was strongest for athletes of low socio-economic status. The higher the socio-economic status and previous scholarship of students, the more they were found to participate in athletics and the higher was their level of scholastic achievement in junior high school. In addition, the results point out that the more and the longer athletes participated in varsity sports, the higher their athletic performance, and the less popular the varsity sport, the more they exceeded their non-athletic matches in scholastic measures. These findings should not be interpreted as meaning that participation in athletics cause the improvement of scholarship. Although this may well be the case, there might be several confounding factors affecting the relationship that were not controlled in this study. But it appears safe to assume, at the least, that athletic participation in the two examined junior high schools does not have a detrimental effect on academic achievement.

April 6, 1970
9:00 a.m.

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CANONICAL RELATIONSHIPS BETWEEN MOTOR, PERSONALITY, AND INTELLECTUAL ACHIEVEMENT ITEMS IN CULTURALLY DEPRIVED HIGH SCHOOL PUPILS. Joseph J. Gruber and Don R. Kirkendall, University of Kentucky.

The purpose of this study was to determine the relationships between the following sets of variables in low achieving, culturally deprived residential high school pupils with above average intelligence: (a) motor fitness and intellectual achievement items; (b) coordination items and intellectual achievement items; (c) personality factors and intellectual achievement items; (d) motor fitness items and personality factors; and (e) coordination items and personality factors. Using ninety-one resident high school students grades 9 through 11 as subjects (male-47, female-44, Negro-41, White-50), data were collected on 34 variables. In addition to age, height, and weight, the variables included: (a) five fitness items: 50 yd. dash, 1000 yd. run, standing broad jump, grip strength, and sit-ups; (b) six items which purport to measure coordination of the arms and legs; (c) the fourteen personality factors comprising the IPAT-HSPQ; and (d) five intellectual achievement measures: Kuhlman-Anderson I.Q.; derived Verbal, Quantitative and Total Stanford Academic Achievement Scores; and a classroom achievement rating. The collected data were then submitted to canonical correlational analyses in an effort to determine if items comprising various multivariate domains were related to one another. Statistical operations were carried out on the IBM 350 Model 50 at the University of Kentucky Computing Center. In all cases there were moderate canonical relationships between the various multivariate domains. The first canonical correlations for each of the pairs of variables indicated in the purpose of this study were respectively .52, .44, .57, .51, and .55. Finally, the relationships indicated by the first canonical root extracted were always higher than the univariate Pearsonian correlation between any two items from a pair of domains.

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April 6, 1970
9:15 a.m.

COMPARISONS BETWEEN SEVENTEEN-YEAR-OLD HIGH SCHOOL ATHLETES AND NONPARTICIPANTS ON STRENGTH, STRUCTURAL, MATURITY, PHYSIQUE, AND MOTOR CHARACTERISTICS. Brian J. Kelly, the University of Texas at El Paso.

This study was designed to determine strength, structural, maturity, physique, and motor differences between high school athletes of varying athletic ability and sports nonparticipants at seventeen years of age. In addition, it was possible to trace the development of these differences longitudinally back to age fifteen years. Two hundred and eight high school boys were tested annually from ages fifteen through seventeen years on skeletal age, somatotype, 3 motor measures, 5 anthropometric measures, 4 composite strength measures and 2 muscular endurance measures. Coaches of football, baseball, basketball, and track rated the ability of the athletes in their sports at age seventeen years as outstanding, good, or fair. On the basis of these ratings groupings of athletes were made within each sport for comparisons with nonparticipants. Group means were computed and tested for significant differences using one way analysis of variance and Scheffé's test. Some of the more significant findings were as follows: Football. Motor ability and strength differentiated outstanding football athletes from nonparticipants, and body bulk and strength differentiated good athletes from nonparticipants at age seventeen years. These differences were more pronounced at age fifteen years, when in addition mesomorphy differentiated all athletes, and skeletal age differentiated good and fair athletes from nonparticipants. Baseball. Baseball players rated as fair athletes had significantly greater means for anthropometric measures at seventeen years of age with a consistent pattern evident through ages sixteen and fifteen years. Basketball. At age seventeen years, outstanding and good basketball athletes were differentiated from nonparticipants by motor ability, mesomorphy, height, and Rogers' Arm Strength score; at age fifteen years the differences were in strength, motor ability, and anthropometric measures. Track. At seventeen years of age, outstanding and good track athletes had greater strength, motor ability, height, and weight than nonparticipants. These differences were more marked at age fifteen years.

April 6, 1970
9:30 a.m.

Brian J. Kelly
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El Paso, Texas

RELATIONSHIPS BETWEEN SELECTED PHYSICAL, MOTOR, SCHOLASTIC, AND PSYCHO-PERSONAL FACTORS AND THE SKELETAL MATURITY OF NINE, TWELVE, FIFTEEN, AND SEVENTEEN-YEAR-OLD BOYS. David J. Sekeres, University of Oregon.

The subjects, selected at random, were divided into three maturity groups according to skeletal age. These three groups were compared on the following variables: somatotype components, body weight, standing height, chest girth x height, ankle plantar flexion, cable-tension strength average, standing broad jump, athletic ability rating, grade point average, Stanford Achievement Test, Iowa Tests of Educational Development, Medford Sociometric Questionnaire, and California Psychological Inventory. The statistical application was one way analysis of variance whereby the differences between the means of the retarded, normal, and advanced maturity groups on the selected independent variables were tested for significance. Where a significant F test provided evidence of an over-all significance among the means of the experimental groups, the Scheffé method was employed to test for differences between pairs of means. Significant differences between the means of all experimental variables at all four ages were most often obtained when the advanced and retarded maturity groups were compared. With all variables except physique type, when the differences between paired means were significant, the more advanced groups had the higher means. Significant differences between the means of all experimental variables were most often obtained when the fifteen-year-old maturity groups were compared. The most frequent significant differences between means were found for standing height; all differences were significant at ages nine, twelve, and fifteen years with exception of the advanced-normal at age nine years. Other test variables which showed high F ratios were body weight and cable-tension strength average. In this study, skeletal age was related most significantly to physical variables, in particular the structural measures of weight, standing height, chest girth x height, ankle plantar flexion, and cable-tension strength average. Some relationships between skeletal age and the motor variables of standing broad jump and athletic rating were shown. By contrast, little relationship was found between skeletal age and scholastic or psycho-personal variables.

April 6, 1970
9:45 a.m.

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A LONGITUDINAL COMPARISON OF THE GROWTH PATTERNS OF BOYS TWELVE THROUGH SEVENTEEN YEARS OF AGE BASED ON PHYSICAL MATURITY AND STRENGTH DIFFERENCES. D. Laine Santa Maria, University of Maryland.

Longitudinal growth patterns of groups of boys were compared over a six-year period. Subjects were compared on the basis of the following: advanced and retarded maturity (criterion measure--skeletal age); high and low levels of gross strength (criterion measure--average of eleven cable-tension strength tests); high and low levels of relative strength (criterion measure--Rogers' Physical Fitness Index). Subjects were participants in the Medford Boys' Growth Study and were tested annually from age twelve through age seventeen years. Each comparison group consisted of 24 subjects selected from a total sample of 123 boys. Comparison groups were formed at twelve years of age and were compared longitudinally on the following growth variables: skeletal age, standing height, sitting height, leg length, hip width, lung capacity, body weight, upper arm girth, chest girth, abdominal girth, buttocks girth, thigh girth, and calf girth. Mean growth curves were constructed and differences between the means of each comparison group were tested by application of the t ratio for each experimental variable at each age of the growth period. Results of the study showed the following: The means of the advanced maturity group exceeded the means of the retarded maturity group for all variables throughout the growth span. The same was true with respect to the high gross strength group when compared to the low gross strength group. However, when groups were formed on the basis of relative strength, the weaker boys obtained higher mean scores than the stronger boys for each measure at each age. Mean differences were significant for 96 percent of the comparisons made between the two maturity groups. Similar percentages for the gross and relative strength group were 95 percent and 74 percent respectively. Each of the three criterion measures showed greater differentiation on measures of body bulk than on measures of linear growth. Mean differences for all experimental variables tended to increase and then decrease during the growth period with the greatest mean difference usually occurring at either age thirteen or fourteen years.

April 6, 1970
10:00 a.m.

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STABILITY OF SOMATOTYFE COMPONENTS OF BOYS AGES TWELVE THROUGH SEVENTEEN YEARS. Gary D. Sinclair, McGill University.

The purposes of this study were to determine the stability of the somatotype, actually phenotype, of a group of 106 boys as they developed from twelve through seventeen years of age, and to determine the consistency of relationship between somatotype components and selected tests of maturity, body size, gross and relative strength, muscular endurance, and motor ability factors. The method of assessing physique type was by use of Sheldon's somatotype. The data were analyzed as follows: (1) For each somatotype component, inter-age differences between means were tested for significance by application of the t ratio applied to correlated groups; in addition, changes and fluctuations in individual somatotype patterns were determined. (2) Multiple correlations and their corresponding regression equations were computed at each age level; for each correlation, a somatotype component was the dependent variable and the experimental tests served as the independent variables. The following results were obtained: (1) A sizeable number of differences between the means of the somatotype components occurred between the ages of twelve and seventeen years. The percentages of significant differences at the .05 level were 40 for endomorphy and 53 each for mesomorphy and ectomorphy. Nearly all significant mean differences occurred when ages intervened; one exception was found for endomorphy, one for mesomorphy, and three for ectomorphy. Inspection of the annual somatotype assessments for each subject in terms of change and fluctuation over the six year period of this study revealed an even greater degree of instability than was portrayed by the differences between the means for each of the components. For the 106 boys, component changes of 1.0 or more occurred between ages twelve and seventeen years as follows: 45.3 per cent for endomorphy, 32.1 per cent for mesomorphy, and 36.8 per cent for ectomorphy. Fluctuations occurred within the six-year period as follows: 56.6 per cent for endomorphy, 15.1 per cent for mesomorphy, and 57.5 per cent for ectomorphy. (2) In some instances multiple correlations of sufficient magnitude to warrant prediction were obtained between the somatotype components and various combinations of experimental variables at each of the six ages. The ranges of maximum multiple correlations with somatotype components included were from .921 to .939 for endomorphy, .878 to .926 for mesomorphy, and .931 to .970 for ectomorphy. Regression equations were computed for these multiple correlations.

Gary D. Sinclair
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April 6, 1970
10:15 a.m.

DEVELOPMENTAL SCREENING ASSESSMENT OF PRE-SCHOOL CHILDREN AGES 4 AND 5 YEARS. Chappelle Arnett, Western Washington State College.

The purpose of this pilot investigation was to devise a simple method of screening developmental levels in pre-school children through the use of gross motor and perceptual-motor tasks. Th assessment covers four functions of perceptual-motor performance: balance, rhythm and coordination, movement patterns, and perceptual-motor-match. The items were designed primarily for use by classroom teachers in nursery schools and in kindergarten. The items were largely descriptive and were concerned with the process, the movement, rather than with the outcome. Items were selected for content validity and suitability and as being within a child's comprehension. The instrument was administered to thirty pre-school children in Columbia, Missouri: 15 children in nursery school and 15 children in kindergarten were included in the study. Criteria established for retention of items were: (1) examiners evidence of ease of administration and scoring of test items; (2) capable of differentiating abilities at each age level and (3) consideration of the size of the correlation coefficients between items. It was concluded that the items utilized did distinguish between developmental levels of four and five year old children and satisfied other criteria. The items included in the assessment were: walking a four-inch balance beam, balance on one foot, a series of alternating hopping tests, movement patterns such as hopping, jumping, throwing, catching, and the chalkboard test.

The study was supported by a grant from the U.S. Office of Education, OEG-6-9-008068-0042.

April 6, 1970
10:30 a.m.

Chappelle Arnett
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A COMPARISON OF THE PERFORMANCE OF SIXTH GRADE STUDENTS, GROUPED BY SELF CONCEPT SCORES, ON PHYSICAL FITNESS, MOTOR ABILITY AND PHYSICAL EDUCATION ATTITUDE. Robert E. Allen, Owen J. Holyoak, University of Florida.

The purpose of the study was to determine if differences exist between quartiles which were established on the basis of self concept scores, within the areas of physical fitness, motor ability and physical education attitude for sixth grade students. Subjects were 114 sixth grade boys and girls enrolled in a demonstration elementary school (School A) and 175 sixth grade boys and girls in another elementary school (School B) in the Suwannee Area Physical Education Project, Lake City, Florida. Subjects were grouped into quartiles in each of the two schools on the basis of scores achieved on the Gordon "How I See Myself Scale," a measure of self concept. The subjects in School A had been exposed to an individualized physical education program for a one-year period. The subjects in School B were exposed to a physical education program organized on a mass instructional basis. Comparisons were made between quartiles in each of the two schools using scores achieved on the AAHPER Physical Fitness Test Battery (by definition, the writers selected the average percentile score for the seven test items as an index of the subject's physical fitness), the Brace Motor Ability Test and the Holyoak-Allen Physical Education Attitude Scale for Elementary School Children, Grades 4-6. The results showed that for subjects in School A, no significant differences (P=.05) existed between quartiles for motor ability or physical education attitude. However, a significant difference (P=.05) was noted between quartiles 2-3 for physical fitness. In School B, significant differences (P=.05) were found for physical fitness between quartiles 2-3 and 2-4; and for physical education attitude between quartiles 1-2 and 1-4. It was concluded that students exposed to a physical education program of an individualized nature showed fewer differences between quartile groups in the areas of physical fitness, motor ability, and physical education attitude when grouped on the basis of self concept, than students exposed to a mass oriented instructional program.

This study was supported, in part, by the Title III Suwannee Area Physical Education Project, Lake City, Florida.

April 6, 1970
10:45 a.m.

Robert E. Allen
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THE RELATIONSHIPS AND CHANGES OF CARDIOVASCULAR FITNESS AND BODY COMPOSITION IN COLLEGE SOCCER, CONDITIONING, AND SWIMMING PHYSICAL EDUCATION CLASS PARTICIPANTS. Robert C. Serfass, University of Minnesota; John F. Alexander, University of Minnesota.

The purpose of this study was to observe the nature and extent of changes in cardiovascular fitness in three volunteer groups of subjects who participated in college physical education classes: soccer (N=17), conditioning (N=18), and swimming (N=17). Fifty-two college males ranging in age from 18 to 27 years were each subjected to a) three running tests of fitness (50 yard dash, 600 yard run-walk, 12 minute run), b) an intermittent treadmill test of maximal oxygen consumption as described by Taylor and others (1955) and c) an assessment of body composition by the deuterium oxide dilution method of Schloerb and others (1950). All subjects were tested prior to and at the conclusionof 8 weeks of their respective physical education classes. The improvements within groups were determined by *t* tests. The relationships between maximal oxygen consumption, body composition and the running tests were determined through the use of Pearson product-moment correlations. Differences between the three groups were determined by one-way analysis of variance. A Preliminary analysis of the data suggests that: a) Subjects in the soccer and conditioning classes exhibit greater significant improvements in cardiovascular fitness parameters than subjects in the swimming class. b) Correlation coefficients between running tests of fitness and maximal oxygen consumption are lower than those reported in previous studies. c) body composition did not change significantly in any of the three groups from pre to post test measures. Other factors considered in this study are: a) test - retest reliability of the intermittent treadmill assessment of maximal oxygen consumption. b) a comparison of the deuterium oxide dilution method of assessing body composition with the densiometric technique of underwater weighing. c) observation of maximal pulse rate, respiratory quotient, oxygen extraction and ventilation equivalent during the attainment of maximal oxygen intake.

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April 6, 1970
11:00 a.m.

AN ON-LINE COMPUTER SYSTEM FOR RECORDING BIOMECHANICAL DATA.

Jiri Sukop*, Kenneth L. Petak, Richard C. Nelson, Pennsylvania State University.

The principal deterent to extensive investigations in human biomechanics has been the excessive amount of time required for quantification of the movement parameters. This problem is especially acute in the measurement of rate of changes in force and acceleration during movement. The purpose of this investigation was to develop a measurement system which would permit rapid, accurate data recording and computation. The system reduces the time for these tasks from a matter of many hours to a few seconds.

Procedures. The principle components in the system are a Hewlett-Packard, Model 2115A Digital Computer and a Model 2401B Digital Voltmeter (DVM). This unit (DVM) serves as a buffer between the peripheral instruments used to record the human movement parameters and the computer. The DC voltages from the measuring instruments are relayed to the DVM, converted to digital representation and fed into the computer. The DVM is synchronized with a very precise 60 Hz. power line, producing a sampling rate of 60 measurements per second. Hence, it is possible to accurately determine the rate of change of the variable under study. The data from one trial are processed through the system to the computer where they are calculated in one second, printed in a few seconds or stored and later fed out and recorded. The system has been used to quantify rate of force and acceleration. Force was measured with a Schaevitz Linear Variable Differential Transformer, Model TCD-4M. Output from this unit was relayed to the computer where components of the force-time curve such as time to point of inflection, force at that point, and impulse (integration of the force time curve) were calculated immediately. Acceleration was measured with two CDC strain gauge accelerometers mounted on the limb of the subject. By processing the output of these accelerometers through the system it was possible to calculate acceleration, velocity, time and related parameters within a matter of seconds.

Conclusion: Preliminary evaluation of the "on-line system" revealed that rapid accurate measurement, calculation and recording of biomechanical data can be accomplished in a few seconds. This "break-through" offers the possibility of; utilizing data from initial trials to alter instruction for subsequent ones, greatly increasing the number of subjects and experimental trials in strength and speed of movement studies, and sharply reducing the time needed to calculate and analyze the recorded data.

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April 6, 1970
11:15 a.m.

EFFECTS OF ACUTE EXERCISE ON THE URINARY EXCRETION OF 5-HYDROXYINDOLEACETIC ACID. Daniel A. Girdano, Texas A&M University.

This study was undertaken in an attempt to determine the fluctuation in 5-hydroxyindoleacetic acid caused by a single bout of physical activity. The design was to (1) establish a normal, resting level of 5-hydroxyindoleacetic acid for each of the twenty-four, male subjects involved, (2) have each subject participate in a one hour bout of physical activity, and (3) determine the post-exercise level of 5-hydroxyindoleacetic acid for each subject. Hourly fluctuations were investigated by collecting the post-exercise sample at three, six, twelve and twenty-four hours after the exercise and analyzing them separately. The influence of physical condition was determined by dividing the subjects into conditioned and unconditioned groups by means of the Cooper Twelve Minute Run-Walk Test and comparing the pre and post exercise levels of 5-hydroxyindoleacetic acid in the urine. The results ($t_{01} = 6.607$) indicated a significant increase in post-exercise levels of 5-hydroxyindoleacetic acid. Analysis of variance indicated a significant variation in post-exercise levels of 5-hydroxyindoleacetic acid. The highest levels appeared within three hours after the exercise and the level approached the resting value toward the end of the twenty-four hours. Further analysis of variance indicated no significant difference between conditioned and unconditioned groups. Within the limitations of the study, it was concluded that there was a significant acute increase in the urinary excretion of 5-hydroxyindoleacetic acid following a single bout of physical activity.

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April 6, 1970
11:30 a.m.

STUDY OF BACK-LIFT STRENGTH WITH ELECTROGONIOMETRIC ANALYSIS OF HIP ANGLE.* Mohan Singh; T. Edwin J. Ashton, University of Alberta.

The purpose of this study was to determine whether or not the use of hands and arms in the measurement of maximum back-lift strength (as in the Rogers' P.F.I. test batter) affected the back strength score. Results using an experimental shoulder harness, which eliminated the use of hands and arms, were compared with corresponding results from the traditional back-lift test. The following four test methods were administered to twenty-four male students at the University of Alberta: (A) Traditional-no-back-support method as used in Rogers' P.F.I.; (B) Same as Test Method A, except with a vertical board to prevent backward lunging; (C) Experimental-shoulder-harness-no-back-support method eliminating use of hands; and (D) Same as Test Method C, except with the vertical board to prevent backward lunging. A sub-problem was to electrogoniometrically determine variations in the hip angle throughout each back-lift test. No significant differences among the four tests were found using maximum scores and the mean scores of the last two trials. Although a significant relationship was found to exist between back-lift score and corresponding hip angle for Test Methods B, C and D, analyses of variance on scores adjusted for this relationship did not show significant differences among the four tests. A descending order in the means of Test C, Test A, Test B and Test D occurred. The mean hip angle ranges for the shoulder harness technique (Tests C and D) exceeded those for the traditional technique (Tests A and B) by no more than 3.96 degrees, with the range in hip angle for the traditional technique and shoulder harness technique being 0.24 and 1.73 degrees less respectively when backward lunging was prevented. A very surprising finding was that in eight and ten of the cases in Test A and Test B respectively, the hip angle decreased (flexed) during the back lift. Effective back-lift strength scores were obtained at an average hip angle of 162.71 degrees. The reliability coefficients were 0.95 for Test A, 0.98 for Test B, 0.94 for Test C and 0.96 for Test D. The corresponding standard errors of measurement were $\pm$ 17.15, $\pm$ 11.93, $\pm$ 24.27 and $\pm$ 23.58 pounds respectively. Test Method B had the highest reliability coefficient and least standard error of measurement.

Supported in part by a research grant from the Department of National Health and Welfare, Ottawa.

April 6, 1970
11:45 a.m.

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COMPARISON OF THE HEALTH ATTITUDES OF ACTIVE AND INACTIVE ADULT MEN AND WOMEN. Linus J. Dowell, Texas A & M University.

It was the purpose of this study to compare health attitudes of active and inactive adult men and women. A Health Attitude Inventory was constructed with categories in: Physical Activity, Smoking, Alcohol, Drugs, and General Health. After revision, based on the results of a pilot study, the Health Attitude Inventory was administered to 80 adults; 20 men and 20 women who were active in the noontime physical fitness program at Texas A & M University, and 20 men and 20 women adult counterparts who were inactive (did not participate in the noontime physical fitness program) but were engaged in comparable occupations to the active group. A coefficient of correlation item analysis was computed for each of the 30 items on the Health Attitude Inventory. The split-half method and Spearman-Brown formula was used to determine category and test reliability for adults on the Health Attitude Inventory. Analysis of variance was used to determine differences between groups. The conclusions of this study were: (1) Adult reliability, category and item analysis of the Health Attitude Inventory compared favorably with other attitude inventories; (2) Women possess a better attitude toward use of alcohol than do men, while men have a better attitude toward use of drugs than do women; (3) Active men possess a better attitude toward physical activity than do inactive men; (4) Active women possess a more positive attitude toward use of drugs and have a better total health attitude than do inactive women;(5) Active adults have a more positive attitude toward physical activity and have a better total health attitude than do inactive adults.

April 6, 1970
9:00 a.m.

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FACTOR VALIDATION OF A SEMANTIC DIFFERENTIAL INSTRUMENT TO ASSESS ATTITUDES TOWARD SMOKING AND HEALTH OF HEALTH EDUCATORS. Walter D. Sorochan, San Diego State College.

The purpose of this study was to construct and to validate an instrument to assess attitudes toward smoking and health of health educators. The technique of semantic differential was selected for adapting the instrument to the subjects and smoking and health. Twenty smoking and health concepts, with each concept having 50 bipolar adjectival scales, were initially selected on an "a priori" basis. The instrument was administered to 115 teachers (grades 4-13) enrolled in a summer post-session at Indiana University. Of the 93 subjects responding, 22 were smokers, 22 were ex-smokers, and 49 were non-smokers. Responses of subjects were subjected to principal components and varimax rotation, and to the alpha factor and varimax rotation analyses. Factor analysis condensed the 50 scales into seven factors and the 20 concepts into four factors. All 20 concepts were subjected to multiple discriminate analysis and significantly discriminated between smokers and non-smokers at the .01 level of confidence. Sixteen scales and 10 concepts for the validated attitudinal scale were identified on the basis of the high factor loadings on the principal factor and low factor loadings on the contaminant factors. In a follow-up study, the refined attitudinal scale was administered to 304 secondary school health educators. To determine instrument reliability, two intra-class correlations were calculated as estimates of how consistently subjects responded between scales and between concepts. Consistency of subject's responses between scales were estimated as .9941, .9631, and .9969, while consistency of subject's responses between concepts were estimated as .689, .708, and .279, for three of the unidimensional attitudes. The following conclusions were obtained: (1) Factor analysis may be used to establish relevancy between scales, concepts, subject-matter and subjects; (2) concepts significantly discriminated between smokers and non-smokers; (3) factor analysis identified unidimensional attitudes toward smoking and health; (4) subjects responded more consistently between scales than between concepts.

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April 6, 1970
9:15 a.m.

PULMONARY FUNCTION OF LIFETIME NON-SMOKERS, LaVon C. Johnson, Brigham Young University; W. Arthur Koski, Oregon State University; James F. Morris, Portland Veterans Administration Hospital.

There is increasing use of spirometers for measuring ventilatory function by individual physicians and pulmonary function screening programs, either as a specific project or as part of a multiphasic program. The increased interest in spirometry is primarily due to the burgeoning incidence of chronic obstructive pulmonary disease. The widespread concern about air pollution and the well-publicized harmful effects of inhaling cigarette smoke have also stimulated public interest in lung function testing. Lagging behind has been the development of precise normal standards. Most recognized standards have been compiled by surveys which included nonsmokers, smokers and former smokers. The purpose of this study was to provide equations and nomograms based upon a healthy non-smoking population. The instrument used was the 10 liter Stead-Wells Spirometer. The ventilatory tests consisted of forced vital capacity (FVC), forced expiratory volume for 1 second (FEV 1.0), forced midexpiratory flow rate (FEF 25-75), and forced expiratory flow rate (FEF 200-1200). Nearly all of the 471 women and 517 men included in the study were members of the Church of Jesus Christ of Latter-day Saints or the Seventh Day Adventist Church. These churches forbid the use of tobacco. The great majority of the subjects reside in the lower Willamette Valley in Oregon which has no large metropolitan area and is relatively free of air pollution. Qualification for acceptance into the study was based upon a questionnaire followed by an interview. A lifetime non-smoker was defined as one who had never smoked longer than six months in his life. The age range of the subjects was from 20 to 80 years. The results are presented in a series of tables. The product-moment correlation (r) based on height and age and the four pulmonary function measurements is a significant part of the study. Negative correlations were obtained between all individual lung function measurements and age. The FEF 200-1200 had the highest positive correlation coefficient with height. Because all four pulmonary functions showed correlation with age and height, prediction formulas were derived for all spirometric variables for both sexes. To facilitate determination of the predicted values, a nomogram for each sex has been constructed which included the four ventilatory functions and the two physical measurements. By a straight edge, between an individual's age and height, all four values of forced expiration may be obtained at once. We conclude that this study will be of great value in both predicting and evaluating pulmonary function.

April 6, 1970
9:30 a.m.

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A STUDY OF THE SMOKING HISTORY AND HABITS OF FRESHMAN AND JUNIOR UNIVERSITY STUDENTS. Agnes M. Hooley, Bowling Green State University.

Within the past decade, a great deal of attention has been paid to smoking, and to the (suspected) deleterious effects which it seems to have on the health of smokers. Recently the anti-smoking campaign has been a colossal one. It was felt that this campaign might have had a greater effect on freshmen than on juniors since it had come to them at a younger, possibly more receptive age, and before they had become confirmed smokers. The study sought to determine differences in tobacco-use habits of freshmen and junior university students. The sample of 300 students represents men and women equally. Interviews were conducted and results tabulated, concerning tobacco-use habits of subjects and their families, and reasons for smoking or not, now and in the past. Overall findings for the population studied are as follows:

1. A majority of college freshmen and juniors do not smoke; more freshmen men than women smoke. The number of smokers is about equal for junior men and women.
2. Among women, the incidence of smoking rises sharply from the freshman to the junior year.
3. While various quantities of cigarettes are smoked daily by individual subjects, the average is half a pack for junior women, and a pack for freshmen women, and male subjects.
4. Tobacco-use habits of mothers seem to have a greater influence on tobacco-use habits of their children, than do the habits of fathers.
5. Smokers, non-smokers and 'quitters' give various reasons for their behavior, but non-smokers give more reasons, express them more forcefully, and tend to be more moralistic than the other two groups. This finding parallels findings in other recent tobacco-use studies.

It can be concluded that the anti-smoking campaigns have had an impact since, in contrast to earlier studies, few freshman subjects smoke. Further, many of those who took up smoking last had already quit. Obviously, in-depth studies need to be carried on to uncover motivation for smoking, for quitting and for avoiding tobacco use. In addition a follow-up study among sophomores and seniors is recommended; do they differ in their tobacco-use habits from subjects in the other two academic years?

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April 6, 1970
9:45 a.m.

A COMPARISON OF LATERAL STARTING TIMES WITH VARYING BODY POSITION AND INITIAL STEP. L. Patrick McLane, University of Bridgeport.

The purpose of this study was to determine which combination of initial step, body crouch and direction of start would produce the fastest lateral start over a distance of three yards. Eight combinations were investigated; starts were made to the left and to the right using two distinctly different degrees of body crouch with cross-over and open-steps as the initial steps. Starts were measured as movement times. An electric timer was used and starts were timed accurate to a thousandth of a second. Lateral starting times and descriptive data were collected for each of forty subjects. Experimental subjects were selected male students enrolled at the University of Arkansas during the spring semester, 1965. The data was placed on data cards and the major computations were made by an IBM 7040 computer at the University of Arkansas. An analysis of covariance was computed using lateral starting times as dependent variables and descriptive data as independent variables. Raw score mean times were adjusted covariance-wise for age, height, weight, body type, athletic experience, habitual first step and lateral dominance of hand, eye, and foot. Adjusted mean starting times ranged between a high of 0.811 second and a low of 0.777 second. Multiple regression was used to determine if the eight mean adjusted times differed. The square of the multiple correlation coefficient was obtained both for the set of eight categorical variables and for the control variables. The square of the multiple correlation coefficient was obtained only for the control variables. The difference between the squares of the two coefficients showed the variability attributable to the eight categorical variables. The R^2 for the full model was found to be 0.1586. The R^2 for the restricted model was found to be 0.1106. The drop of 0.0480 in the square of the multiple correlation coefficient when the eight categorical variables were excluded from the full regression was not significant. The data indicated that the cell means did not differ significantly. A study of the correlation matrix showed no significant correlations between variables. The results of this study seemed to justify one conclusion. This conclusion is that the amount of body crouch, neither slight nor deep, type of initial step, neither open nor cross-over, direction, neither right nor left, have a significant effect upon a lateral start of three yards.

April 6, 1970
10:00 a.m.

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RELIABILITIES OF SELECTED VOLLEYBALL TEST ITEMS, Ben R. Londeree, Purdue University.

Male physical education majors enrolled in an activity class which included six weeks of volleyball instruction were administered selected volleyball serve and wall volley tests. The serve tests included the French-Cooper and Wisconsin items with two trials of fifteen serves each. The wall volley tests included the Brady, French-Cooper, Russell-Lange, and Clifton (modified to a six foot restraining line) tests. The net line was set at eight feet and men's rules were used where applicable; otherwise the tests were administered as suggested by the authors. Six trials of the French-Cooper Wall Volley Test and four trials of each of the other wall volley items were administered. Generally the results showed unsatisfactory reliabilities to warrant use as a sole basis for determining course grades. This was particularly true of the serve tests. Based on the sizes of the reliabilities the wall volley tests ranked from best to worst as follows: Brady, Russell-Lange, Clifton, and French-Cooper. When comparing these results with those of the original constructors it was concluded that the reliabilities in this study were adversely influenced by artificial ceilings imposed by several of the tests, homogeneity of the subject's ability, and the relatively advanced skill level of the subjects. To investigate the precision of the Spearman-Brown Prophecy Formula, comparisons were made between predicted and actual reliabilities resulting from increasing trial length and/or the number of trials. Trial length was varied on the serves (10 vs. 15 serves) and French-Cooper vs. Russell-Lange volleys (15 vs. 30 seconds). The number of trials was increased for all of the wall volley tests. In four of seven comparisons the predicted r's were approximately the same as the actual reliabilities. However, on three of the tests the predictions were considerably high. On the multiple trial tests there was somewhat of a learning trend suggested by increasing trial means. The single best item of those evaluated was the Brady Wall Volley Test. In contrast to Brady who suggested one trial, it was found that at least three and probably four trials were required for satisfactory reliability for a homogeneous group of better than average volleyball players.

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April 6, 1970
10:15 a.m.

COMPARISONS OF SELECTED PERFORMANCES WITH NATIONAL YOUTH FITNESS DATA 1958-1965. John M. Chevrette, Texas A&M University.

The Suwannee Area Physical Education Project is a Title III, P. L. 89-10, project located at Lake City, Florida. Melrose Park School (Project center) student (N1540) were administered the AAHPER seven item test at the inception of the project (October '67) and six months later (April '68). The purpose of this study was to examine the pre and past program scores, to relate these performances to the 1965 AAHPER national norms and to relate the performance changes (gains in this case) to the changes in national norms from 1958-1965. Substantial changes appeared to have occurred in the six month period on nearly all items of the test. It was concluded that levels of fitness of 4th, 5th and 6th grade elementary school children can be affected markedly in a relatively short period of time, that the type of equipment used in the program appears to be desirable in improving levels of fitness, and that under the present program upper body strength was more likely to result than other components of fitness.

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April 6, 1970
10:30 a.m.

THE CANONICAL RELATIONSHIPS BETWEEN MOTOR PERFORMANCE AND PERSONALITY CHARACTERISTICS. Don R. Kirkendall, University of Kentucky; A. H. Ismail, Purdue University.

The purpose of the study was to investigate the relationships between sub-domains of motor performance and personality characteristics through the use of canonical correlation analyses. In addition, a comparison between the univariate and multivariate investigation into this relationship will be discussed. Two hundred and five children (113 boys, 92 girls) who ranged from 10-13 years of age served as subjects for the study. Twenty-one motor performance items were administered to the children. The twenty-one items consisted of four general motor performance items (40 yd. shuttle, SBJ, grip strength, and goal shooting), nine purported coordination variables (6 leg, 3 arm), and eight balance items. The personality traits measured were the 15 factors of the Porter and Cattell Children's Personality Questionnaire. The relationships between the domain of personality as measured and the total motor domain and each sub-domain of motor performance was determined by the use of canonical correlation analysis. Furthermore, the results of the canonical relationships were compared with those obtained by univariate Pearson-r relationships. In all cases, there was a significant relationship found between the personality domain and the motor domain. The highest relationship found was between the personality domain and the total motor performance battery, followed by the relationship between personality and coordination, then between personality and balance. The first or largest canonical correlations for each of the above were, respectively, .63, .53, .44, and .42. Finally, the relationships indicated by the multivariate solution were generally higher than the univariate solution.

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Dept. of Health, Phy. Ed., and Rec.
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April 6, 1970
10:45 a.m.

VALUES OF PHYSICAL ACTIVITY PERCEIVED BY MALE UNIVERSITY STUDENTS. Charles O. Dotson, Stephen F. Austin State University.

It was the purpose of this study to determine attitude profiles of male college students with the view to comparing the perceived values with size of high school attended, their record of achievement in athletic and non-athletic activities, and the elected physical activity course. Six hundred ninety-nine lower division male students enrolled in eight elected physical activity courses at Stephen F. Austin State University served as subjects. The courses were: archery, badminton, bowling, gymnastics, handball, tennis, weight training, and wrestling. Kenyon's Attitude Toward Physical Activity Inventory Form D (ATPA) was used to assess perceived values. Data relative to size of high school attended and record of achievement in athletic and non-athletic activities were recorded on an activities history questionnaire. Athletic achievement was expressed as a weighted linear compound of the number of years out for a high school sport, the number of letters earned, number times elected team captain, all-district and all-state participations and honors. Achievement in non-athletic activities was expressed as a weighted linear compound of the number of years participating in interscholastic league activities and all-regional and all-state honors. Intercorrelations among the measured variables were computed for each activity group. Analysis of variance for a two factor factorial design with repeated measures was utilized to test for differences among mean attitude responses for the activity groups. A posteriori tests were made when significance were indicated by the analysis of variance. It was concluded that: (1) Selection of physical activities, where permitted within the general university curriculum, may be described as a function of both the intensity and type of perceived value expressed toward physical activity. (2) No significant variations in attitudes toward physical activity can be explained by the size of high school attended. (3) Achievement in athletics is most highly related to the perceived value of physical activity for "ascetic experience." (4) No significant relationship exists between attitudes toward physical activity and non-athletic extracurricular activities.

April 6, 1970
11:00 a.m.

Charles O. Dotson
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EXPRESSED AND PERCEIVED ATTITUDES OF STUDENTS AND TEACHERS TOWARD PHYSICAL EDUCATION. Karen B. Wright, The University of West Florida.

This investigation was designed to determine if significant differences existed between the expressed attitudes and perceived attitudes of grade ten girls and their physical education teachers toward physical education. Subjects consisted of the total population of 1440 grade ten girls in the public schools of Austin, Texas and 19 physical education teachers. The Wear Attitude Inventory Short Form A was utilized to measure attitude. To measure perceived attitude, the same instrument was used, the only exception being that each teacher was asked to respond as she thought her class would and each student was asked to respond as she thought her teacher would. Analysis of variance and the Newman-Keuls test were employed to determine significant differences among teacher expressed, teacher perceived, student expressed, and student perceived attitudes on the four subscales of the Wear Inventory as well as on the total scores. Significant differences were found between expressed attitudes of students and teachers and between expressed attitudes of teachers and their students' perception of the teacher's attitude. No significant difference was found between the attitudes of students and their teacher's perception of their attitudes. However, a significant difference was found between the attitudes of students toward the physical values of physical education and the teachers' perception of their students' attitudes. The results of this study seem to indicate that the physical education teachers had better attitudes than did their students toward physical education. The students did not perceive the attitudes of their teachers to be as favorable as the teachers actually expressed. The teachers were able to perceive accurately the attitudes of their students on the social, emotional, and general value subscales of the Wear Inventory. The students had more favorable attitudes toward the physical values of physical education than the teachers perceived.

Karen B. Wright
Physical, Health, and Recreation Ed.
The University of West Florida
Pensacola, Florida 32504

April 6, 1970
11:15 a.m.

THE EFFECT OF PHYSICAL EDUCATION ON THE INTELLECTUAL, SOCIAL, AND PHYSICAL PERFORMANCES OF PRE-SCHOOL CHILDREN. B. Joe Brown, University of Cincinnati.

The purpose was to determine the effect of a structured six weeks physical education program on the intellectual, social, and physical performance of pre-school children. Sixty-seven children were randomly selected and placed in classrooms according to socio-economic level. From these groupings, 21 children were randomly selected to participate, as a part of their classroom work, in a structured physical education program. Forty-six of the children were given recess time in place of physical education. Both groups received instruction in language arts, math, science, music, and art. The two groups did not significantly differ with respect to their initial intellectual, social, or physical performances, but after six weeks of structured physical education, the physical education group's intellectual, social, and physical performances were significantly superior to the non-physical education group's. Therefore, it was concluded that a structured physical education program can significantly improve the intellectual, social, and physical performances of pre-school children.

B. Joe Brown
Department of HPER
University of Cincinnati
Cincinnati, Ohio 45221

April 6, 1970
11:30 a.m.

RELATIONSHIPS AMONG SELECTED PHYSIOLOGICAL, BIOCHEMICAL AND AUDIOLOGICAL VARIABLES. A. H. Ismail, Don Corrigan, D. MacLeod, Purdue University.

Recently, audiological research has suggested that a lack of hearing sensitivity may be a risk factor of coronary heart disease. Populations characterized by less incidence of coronary heart disease and arteriosclerosis have been found to possess better hearing at high frequencies and less threshold shift than populations which do not exhibit such traits. The amount and intensity of physical activity have been shown to be related to coronary heart disease. Thus, one's degree of physical fitness status might be related to his auditory receptiveness. Therefore, the purpose of the study was to investigate the relationships among selected physiological, biochemical and audiological variables before, during and after an eight-month physical fitness program. Complete data on 39 variables were obtained from 71 Purdue University staff and faculty men between 26 and 62 years of age. The physiological variables included were: heart rates at rest, submaximal, and maximal exercise, resting systolic and diastolic blood pressures, pulse pressure, maximum O_2 uptake, and percent of lean body mass. Variables representing the biochemical domain which are of metabolic interest were serum glucose, serum cholesterol and pH. These variables were collected at rest, submaximal, maximal and after a ten-minute recovery period. Pure-tone thresholds, different degrees of high frequency tone decay, and temporary threshold shift following noise exposure at different intervals were collected to represent the audiological domain. The data were collected three times during an eight-month physical fitness program. Accordingly, the data collected were analyzed three times using the correlation and factor analysis techniques. The results obtained from the initial, intermediate and final data were compared. In general, the hypothesis dealing with the relationships among physiological, biochemical and audiological variables were held tenable. In addition, the stability of such relationships was confirmed based on the three factor structures obtained. Some changes in the three factor structures were observed which might be contributed to changes in the physical fitness, as well as hearing ability, of the participants. The significant changes observed in the univariate relationships between some physiological, biochemical, as well as audiological variables at the beginning, during and at the end of the physical fitness program might be attributed to the program.

A. H. Ismail
Purdue University
Lafayette, Indiana

April 6, 1970
11:45 a.m.

OXYGEN VENTILATION DURING STEADY STATE WORK, RECOVERY AND VARIED CLIMATIC CONDITIONS. Wayne H. Osness, University of Kansas.

This study was designed to determine possible changes in oxygen ventilation during exercise with varying ambient temperature and humidity conditions and to determine the correlation between this parameter and other physiological parameters during these conditions. These included measures of pulmonary function, cardio-vascular activity, anxiety, body temperature, plasma metabolite concentrations and others. Oxygen ventilation along with 41 other parameters were studied at rest, during steady state work for eight minutes and recovery for five minutes. The data was collected continuously during a complete rest test and four exercise tests of 300, 600, 900 and 1200 Kpm of work. A total of one hundred tests were run on each of three subjects using a variety of ambient temperatures ranging from 38° to 110° F and humidity ranging from 19% to 100%. The subjects used were young males ranging in age from 22 to 29. They were brought into the laboratory in a controlled dietary condition and acclimatized to the conditions of the test. The tests were all run with the subjects in a clo 1 condition on a bicycle ergometer. The data collected was computerized to obtain information relative to the possible changes occurring in oxygen utilization during the test conditions indicated. Measure of central tendency and variation were computed to obtain possible significant differences illicited by the conditions cited and intercorrelations were computed to study the relationship between changes in this parameter and the other parameters.

April 6, 1970
12:00 noon

Wayne H. Osness
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COMPARISON OF THE USE OF THE ACTIVE GAME LEARNING MEDIUM AND TRADITIONAL MEDIA IN THE DEVELOPMENT OF FIFTH GRADE SCIENCE CONCEPTS WITH CHILDREN BELOW NORMAL IQ's. James H. Humphrey, University of Maryland. (C. Mitchell Dayton, Associate Professor of Education, University of Maryland, served as a consultant in certain aspects of this study.)

The purpose of this study was to determine how well certain science concepts could be developed by the active game learning medium with children with below normal IQ's at the Fifth Grade level as compared with some of the traditional media used to develop these concepts. Two groups of Fifth Grade children with below normal IQ's were equated by matched pairs on the basis of pretest scores of an objective test on science concepts. The test contained 100 items and a reliability coefficient of .90 was obtained on a test-retest basis using a similar group of children. One group was designated as the active game group and the other as the traditional group. Both groups were taught the same science concepts by the same teacher. One group of children was taught through the active game medium and the other group through various traditional media. The teaching was over a two-week period at which time the children were retested. Following the second test there was no formal instruction on the science concepts that were taught during the two-week period. All children were retested for retention at an extended interval of three months after the second test. The mean score of the test to equate the groups was 41.6. The mean score of the second test of the traditional group was 50.2 and for the active game group, 69.9. The extended interval mean score for the traditional group was 50 3, and for the active game group, 73.3. Comparison of the second test scores and the extended interval test scores were evaluated by use of the standard error of the mean difference and t ratio. The difference in the second test favored the active game group, $P < .01$ (t=4.33,df 9). The difference in the extended interval test also favored the active game group, $P < .001$ (t=6.37, df 9). Using the differences in test scores as criteria for learning, the children in the active game group learned and retained significantly more than those in the traditional group.

April 6, 1970
1:00 p.m.

James H. Humphrey
University of Maryland
College Park, Maryland 20740

THE EFFECT OF VIDEO-TAPED FEEDBACK AND ENVIRONMENTAL CERTAINTY ON FORM, ACCURACY, AND LATENCY DURING SKILL ACQUISITION. Patricia Del Rey, Queens College.

This study was undertaken to investigate the effects of video-taped feedback on form, accuracy and latency during acquisition of a motor skill. The skill selected was the classical fencing lunge against two lateral targets, performed under environmental conditions of uncertainty and certainty. In an environment of highest uncertainty, for example during active play in a game of basketball, one must be constantly attuned to the stimuli in the environment so that a specific movement can be chosen at the appropriate time. In an environment of highest certainty, for example while foul shooting in basketball, one must block out the stimuli from the environment and concentrate on one's form of movement. The S in the uncertain environment was not told which of the two lateral targets to lunge toward. In the certain environment the S was told at which target to lunge. The S's signal to lunge was the illumination of the target. A slide projector was associated with each target. At the end of the seven second inter-trial interval one target was illuminated. The S in the certain environment was told during the inter-trial interval which target would be illuminated. The S in the uncertain environment was not told which target was to be illuminated so that she had to select and execute one of two possible movements at the time the target was illuminated. Video-taped feedback was used as terminal augmented feedback since it consisted of a visually taped playback of the performer's movements. It was expected that video-taped feedback would be more effective in learning a skill performed in a certain environment since the emphasis is on form of movement in that environment. Form (a rating scale), accuracy (points on target touches) and latency (movement time) were taken to measure the effects of video-taped feedback. An analysis of variance was computed on all three measures. Video-taped feedback significantly ($p<.05$) improved the form and accuracy of the Ss in the certain environment; it significantly improved the latency of the Ss in the uncertain environment.

April 6, 1970
1:15 p.m.

Patricia Del Rey
Queens College C.U.N.Y.
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RELATIVE EFFECTIVENESS OF TEACHING A GYMNASTIC SKILL USING THE INSTANT REPLAY VIDEOTAPE RECORDER. Andrew E. Huffty, Stephen F. Austin State University.

The purpose of this study was to compare the effectiveness of teaching a gymnastic skill with the use of the instant replay videotape recorder with the traditional method of teaching without the videotape recorder. On the basis of composite "T" scores from seven motor ability test items, twelve college male students were assigned to high, medium, and low motor ability levels. Members of matched pairs from each motor level were randomly assigned to the control and experimental groups. Both groups were taught the same gymnastic skill, a dislocate on the still rings; however, the experimental group had use of the instant replay videotape recorder. The investigation lasted two weeks or six instruction periods of approximately 40 minutes each. During the last class period of the investigation two performances of each subject were recorded on the videotape recorder. The videotape was then viewed by three gymnastic experts who judged each performance. Analysis of variance for a partial hierarchal design with repeated measures for the judges factor was used to analyze the data. The study allowed a determination of the effectiveness of the videotape recorder in teaching gymnastic skills for the motor ability groups. All tests of significance were made at the .05 level. The results of this study showed there was no significant difference between the two methods of teaching a dislocate on the still rings.

April 6, 1970
1:30 p.m.

Andrew E. Huffty
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THE VALUE OF VIDEO SELF-ANALYSIS AS A REINFORCEMENT TECHNIQUE FOR LEARNING WHEN SUBSTITUTED FOR ACTUAL PRACTICE OF GROSS MOTOR SKILLS. Harold C. Rhea, Wake Forest University.

This study was concerned with providing a video self-analysis for reinforcement during one of the class periods normally used for actually practicing gross motor skills. If this technique provided significant learning experiences, it would then be possible to spend less time in actually practicing skills in the activity class, and this would free the facility for another class and substantiate its use during inclement weather. Two theory and practice of swimming classes (N=54 men-27 matched pairs) were taught by the same instructor, and each class had a control and an experimental group. The control and experimental groups of each class received identical instruction, except for the class period when the video-tape recorder was used with the experimental group. The measurement device used in this study was the test scores obtained from subjective ratings and timed measures taken at the end of the learning session. A t-test was used to determine if there were any significant differences between the means of the control and experimental groups at the .05 level of significance. There was no significant difference between control and experimental groups in achievement of learning for the flip turn, tumble turn and butterfly swimming stroke. Thus, it can be assumed that the use of the video-tape replay, when substituted for a part of actual class practice time, may be as effective as the traditional process of continuous instruction, demonstration and practice. Use of the video-tape as a partial substitute for actual practice did not enhance the achievement in swimming skills.

Harold C. Rhea
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April 6, 1970
1:45 p.m.

RELATIONSHIP BETWEEN PERFORMANCE IN MOTOR FITNESS TEST AND THE HIGH JUMP BY HIGH SCHOOL GIRLS. Nancy Molignoni, Arizona State University.

The purpose of this study was to construct a test battery that would be feasible as a device vor predicting success of junior and senior high school girls in high jumping, western roll method. The subjects in this study were junior and senior female students enrolled in the elective physical education program at McClintock High School, Tempe, Arizona, during the spring semester, 1969. On the basis of the ability to measure a wide range of physical factors, the reliability and validity as tests of physical performance, the ease with which the tests could be administered and scored, and the fact that data obtained could be handled in an objective, statistical fashion, the following fitness tests were selected: leg dynamometer test, vertical jump test, modified vertical jump test and the AAHPER youth fitness tests. John Powell's western roll method of high jumping was employed. Utilizing the Pearson produce-moment method of correlation, coefficients between the raw scores of each test item and the criterion score, the high jump, and each test item with every other test item were computed. Six test items yielded significant correlations with the criterion measure and were combined into three batteries with the method used for correlation being that of a multiple linear regression. The Doolittle method of multiple correlation was then applied to the most significantly related combination of tests. The results of this method revealed a two item test battery, consisting of the standing broad jump and shuttle run, to have a high multiple correlation coefficient of .808 with the criterion. It was concluded that the formula X_o = .222 x (standing broad jump in inches) - 1.937 x (shuttle run in seconds) + 47.089 using raw scores from this battery could be recommended as a device to discover and encourage the potential performer.

April 6, 1970
2:00 p.m.

Nancy Molignoni
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EFFECTS OF ACADEMIC COURSE PLACEMENT UPON THE COMPOSITION OF PHYSICAL EDUCATION CLASSES OF TWELVE-YEAR-OLDS.* Billy E. Gober, University of Georgia.

The purpose of this study was to determine the effect of academic course placement upon the composition of physical education classes. Students who are administratively grouped for instruction in the classroom and subsequently attend physical education classes are experiencing placement in the physical education program. The criteria for the grouping is the same, however, as that for academic courses. Does this procedure enhance the physical education program, or detract from it? Data was gathered on 304 female and 379 male subjects, 12 years of age, in regards to height, weight, I.Q., academic course placement and measures of physical fitness. Correlation coefficients and analysis of variance were employed in the treatment of the data. Significant correlation, at the .05 level, between I.Q. and physical fitness items were recorded for male subjects in sit-ups, standing broad jump and softball throw. A negative correlation, significant at the .01 level, was noted between I.Q. and the flexed-arm hang for female subjects. Variance analysis reported significant F-values at the .01 level for flexed-arm hang for female subjects with an inverse relationship between I.Q. of the groups and success on this physical fitness test item. No significant F-values were noted between groups for male subjects. The statistical evidence was not consistent enought to reject the null hypothesis that no relationship exists between intelligence and physical fitness as measured in this investigation.

*This research was conducted as part of the activities of the Research and Development Center in Educational Stimulation, University of Georgia, pursuant to a contract with the United States Department of Health, Education and Welfare, Office of Education, under provision of the Cooperative Research Program. Center No. 5-0250. Contract No. OE 6-10-061.

April 6, 1970
2:15 p.m.

Billy E. Gober
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THE EFFECT OF VARIED INTENSITIES OF PHYSICAL EXERTION AND LEVELS OF AEROBIC CAPACITY ON THE PERFORMANCE OF A NUMERICAL TASK.

Richard B. Flynn, University of Nebraska at Omaha; Bernard Gutin, Teachers College, Columbia University.

The purpose of this study was to investigate the effect of varied intensities of physical exertion on numerical task performance (accuracy score) of subjects with varying aerobic capacity (AC) levels. Thirty male subjects, ages 9 to 11, were separated into three groups (high AC, moderate AC, low AC) according to relative aerobic capacity levels as determined by performance on a sub-maximal work test on the bicycle ergometer. The formal test consisted of a three minute rest period while the subject was seated on the bicycle ergometer, followed immediately by a six minute bout of physical exertion (rest, 0, 150, 300, or 600 kpm/min.), followed immediately by a three minute numerical task. The numerical task consisted of working problems containing three digits to add and/or subtract, i.e. 8 - 5 + 3 = ____. Each subject was formally tested on five days - each day with a different level of physical exertion. Heart rate was recorded following each minute of rest, during each minute of physical exertion, and following each minute of the numerical task. Accuracy score, speed score, and heart rate data were analyzed in separate three-way analyses of variance, after which post hoc comparisons were made utilizing Duncan's Range Test. The results indicated that statistically significant differences existed for speed score data and for heart rate data, but not for accuracy score data, the primary dependent variable. Within the limitations of this study, numerical performance did not significantly differ following the five intensities of physical exertion, and numerical task performance did not significantly differ for the three AC groups.

April 6, 1970
2:30 p.m.

Richard B. Flynn
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Omaha, Nebraska 68101

THE STANDPOINT IN PHENOMENOLOGY. William A. Harper, Kansas State Teachers College

In order to perform a needed clear and accurate phenomenological investigation into the presupposed foundations and essential structures of either physical education generally or sport specifically, one must gain insight into the idea of phenomenology. Therefore, it was the purpose of this investigation to clearly understand the method of phenomenology. The method required in approaching this purpose was to carry out intensive studying of the work of the father of phenomenology, Edmund Husserl. The primary source was Husserl's Ideas, with supplementary studying in Logical Investigations, The Idea of Phenomenology, Cartesian Meditations, The Paris Lectures and the long essay, "Philosophy as Rigorous Science". Phenomenology, as conceived by Husserl, is a rigorous and radical descriptive science with its realm of investigation centered upon the essence of consciousness and what is given in it. This science is made possible through a shift in standpoint, from examining the individual existents in the world of our everyday living to the inspection of universal essences which are given in the experiencing of the world. All particulars, the existence of which is always doubtable, including such things as this chair and that brown football, are suspended and all judgements concerning them are held in abeyance. That however which is indubitable and is the necessary foundation for establishing truth, is the experience itself, the perceiving of the chair, or other experiences such as imagining, judging, desiring, feeling, wishing, fearing, remembering or dreaming. These experiences exist without question and do not depend for their existence upon the existence of that of which they are conscious. Therefore, the indubitable and necessary evidence of the phenomenological standpoint is a reflective glance, not at the individual objects of which we are aware (that brown football), but rather at the consciousness of these objects as they are given as universals (the essence, the "whatness" of footballs in general). The reflective glance toward consciousness and what is given in it can reveal the essential structures of our world in general, and can specifically provide a method for the profession of physical education to once and for all carefully and clearly inspect the heretofore presupposed foundations upon which it rests.

April 6, 1970
1:00 p.m.

William A. Harper
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Emporia, Kansas 66801

A FUNCTIONAL COMPARISON OF FOOTBALL AND RUGBY AT THE UNIVERSITY OF CALIFORNIA. B. Allan Tindall, University of California, Berkeley.

The University of California was one of three collegiate institutions in the nation to react to the "football crisis" of 1905 by replacing American football with English rugby for the 1906 season. It has been hypothesized that rugby could not have fulfilled the same social functions as football. The University of California offers a unique opportunity to use historical evidence to test the hypothesis that American Football and English rugby could not have been functionally equivalent. The historical evidence used detailed the function of both sports for the three major component groups of the University of California; the members of the faculty, the students, and the alumni. The analysis of the data was based on the social anthropological theoretical conceptualization of action, which holds that an evaluative process, based on the values and goals of the people concerned, determines whether or not an object (in this case either sport) is functional or disfunctional to the people concerned. Through the analysis of the pertinent historical data it was possible to determine how each sport was functional to the members of the faculty, the students, and the alumni, during the tenure of either sport. Following the preliminary assessment of the function of each sport, a comparison was made to determine if the two sports were functionally equivalent, or functionally disparate (as the hypothesis holds that they must be). It was found that both sports were functionally equivalent: (1) to the faculty as mediums through which they ensured "thorough and complete education" for the students; (2) to the students as mediums through which they were able to demonstrate that they had learned certain moral and social lessons; and (3) to the Alumni as mediums through which they were able to promote fellowship within their group and support the University.

April 6, 1970
1:15 p.m.

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THE RELATIONSHIP BETWEEN THE FREQUENCY AND THE EFFECTIVENESS OF SELECTED SUPERVISORY BEHAVIORS AS PERCEIVED BY PHYSICAL EDUCATION TEACHERS AND THEIR SUPERVISORS IN SELECTED SECONDARY SCHOOLS OF NEW YORK STATE. Jerrold S. Greenberg, Boston University.

The purposes of this study were: (1) To investigate the congruence of perceptions of supervision of secondary school physical education teachers of New York State and their supervisors; and (2) To investigate the relationship between the teachers' perceptions of supervisory behaviors and their sex, age, year of teaching experience, tenure status, coaching duties, level of education, and the type of school district in which they were employed. In order to determine the teachers' and supervisors' perceptions, all 202 superintendents of school districts, who had indicated on a New York State Education Department survey that they employed a person who spent more than 50 percent of his time giving district-wide leadership and supervision for physical education, were asked to participate in this study. A total of 237 teachers and 41 supervisors from 38 school districts were the subjects in this investigation. The revised form of the Opinion Inventory of Supervision was administered to these subjects. Content validity and test-retest reliability were tested for on this instrument. The obtained reliability coefficients were .89 for the frequency scale and .83 for the effectiveness scale. The data was analyzed by Pearson Correlation Coefficients, t tests, F test tests, Scheffé tests, and two-way analyses of variance. The level of significance used for this study was .05. The results of this study indicated that the perceptions of the teachers and the supervisors were statistically significant. It was concluded that the teachers and supervisors agreed in their perceptions of the frequency and effectiveness of supervisory behaviors as regards the rank order of these behaviors, but disagreed in their perceptions of the frequency and effectiveness of supervisory behaviors as regards their degree. It was further concluded that coaching duties and level of education were not related to the teachers' perceptions of either frequency or effectiveness of supervisory behaviors, whereas the teachers' sex and ages were related to their perceptions of both the frequency and the effectiveness of supervisory behaviors.

Jerrold S. Greenberg
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April 6, 1970
1:30 p.m.

THE DEVELOPMENT OF AN INTRAMURAL SPORTS SCORE CARD AND ITS APPLICATION IN THE EVALUATION OF THE INTRAMURAL SPORTS PROGRAMS FOR MEN IN KANSAS COLLEGES AND UNIVERSITIES. Arthur A. Ridgway, University of Arkansas.

The purpose of the investigation was (1) to develop a score card which could be used to determine the status of the men's intramural sports programs in institutions of higher education, and (2) to use the instrument as the data-collecting device in evaluating the men's intramural sports programs in the four-year colleges and universities in Kansas. An evaluative instrument in the form of a score card was developed and administered to the intramural sports directors in the twenty selected institutions. Score card reliability, 86.9 per cent, was estimated by computing a consistency index. The data analysis permitted the degree of attainment of each of the ninety score card criterion to be determined, and a comparison of the mean level of attainment of the various institutional classifications by use of the $\underline{t}$ ratio technique to be computed. The conclusions were as follows: (1) There was a definite variation among the institutions of higher learning in Kansas as to the status of their men's intramural sports programs. (2) Although the mean per cent of attainment for the existing men's intramural sports programs was generally higher for public than for private institutions, for medium-sized than for small institutions, for large than for small institutions, for large than for medium-sized institutions, and for universities than for colleges, no significant difference, at the .05 level, existed between the programs in any two institutional classifications. (3) Large public institutions of university status most adequately met the recommended score card standards. (4) The quantity and quality of finances, facilities, and equipment was the most reliable indicator of the status of the total intramural sports program. (5) The majority of schools in this study attained high and low scores in all score card divisions; however, their existing programs appeared to be most adequate in the area of rules and regulations.

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April 6, 1970
1:45 p.m.

SELF-CONCEPT, ASPIRATION LEVEL, AND PERFORMANCE IN COMPETITIVE TRACK AND FIELD AT THE HIGH SCHOOL LEVEL. Clifford A. Boyd, University of Florida.

The purpose of this study was to investigate the relationships among self-concept, aspiration level, and competitive performance of high school track and field athletes. Self-concept, in this study, was viewed as the image each person held of himself as a track and field competitor. The Semantic Differential idea was utilized in constructing a seven point scale of fourteen different but related word ideas. Each subject selected a position on the scale which best represented his own self-concept. The mean score of the fourteen items represented the subject's score (self-report index). Twenty-eight members of the P.K. Yonge School Track Team (Gainesville, Florida) served as subjects in the study. Before each of seven meets, each team member privately predicted his performance in each event in which he was scheduled to participate. A total of 271 predictions were made. Additionally, the coach privately predicted the performance of each person in each event. The actual recorded performance in each event by meet officials according to official rules was used as the performance measure. The following statistical relationships were significant at the .01 level:

Self-report index versus player performance
Self-report index versus player prediction
Self-report index versus coach's prediction
Player prediction versus performance
Coach's prediction versus performance
Coach's prediction versus player prediction

Within the confines of this study the following conclusions can be drawn: (1) The self-concept of competitive high school tracksters, as measured by the Semantic Differential, is significant to performance. (2) Constant evaluation of performance provides for accuracy in predicting success. (3) Performances in the competitive situation are rather similar to those in practice situations, when measurable outcomes are involved.

April 6, 1970
2:00 p.m.

Clifford A. Boyd
College of Physical Ed. and Health
University of Florida
Gainesville, Florida 32601

INFLUENCE OF PERCEIVED ASPECTS OF PARENTAL AND PEER EXPECTANCIES, WARMTH, AND AUTHORITY ON SELF-IDENTIFICATION AS ACTIVE AND COMPETENT MOVEMENT PERFORMERS. Carole A. Oglesby, Purdue University.

Upon analyzation of the expectancies associated with woman's role, it seems possible that contradictions exist, particularly between "so-called typical feminine behavior" and that expected of a skillful movement performer. When the skilled woman performer reflects activity, strength, and competence she has either accepted some "masculine" characteristics as her own or she accepts them as human, rather than sex-linked, features of personhood. The purpose of this study is to analyze the influence of parental and peer expectancies on the willingness of kindergarten, fourth, and tenth grade girls to identify themselves as active and competent movement performers. Through personal interviews with the (22) kindergarten subjects and paper-pencil questionnaires for the (59) fourth grade and (30) tenth grade subjects, measures of the following variables were obtained: (1) self-identification as either an active or a quiet girl; (2) mother and father warmth; (3) mother and father authority; (4) mother, father, and friends expectancies regarding the amount of effort expended and level of skill attained by girls in movement activity. Results of chi square tests indicated that seven variables were associated with self-identification patterns beyond chance expectations (.05 level). Seventy-five per cent of the subjects reported themselves to be active, wishing to remain active. All variables were tested for correlation with self-identification patterns. Father Amount-of-Effort and peer Level-of-Skill expectancies were correlated positively (.05 level) with active self-identification. In the ANOV tests comparing the variables across the age groups, the kindergarten group reported significantly higher (beyond .05 level) Amount-of-Effort expectancies for mothers, fathers, and friends. In general, it appeared that differing modeling patterns could be discerned for the three age groups.

April 6, 1970
2:15 p.m.

Carol A. Oglesby
Physical Education for Women
Purdue University
West Lafayette, Indiana

THE INFLUENCE OF PHYSICAL ACTIVITY TO SELECTED CARDIAC-CYCLE TIME COMPONENTS. Paul S. Fardy, California State College at Fullerton.

The study investigated the effects of different physical activity levels upon the duration of selected cardiac-cycle time components. The measures of primary interest were: electro-mechanical lag, mechanical systole, total systole, 1st heart sound to onset of ejection, Q to ejection, ventricular diastole, rest/work ratio, and heart rate. All tests were administered in a post absorptive, resting condition. An E & M Physiograph Six multichannel recorder with a paper speed of 50 mm per second was employed for simultaneous recording of the radial pulse wave, phonocardiogram, and electrocardiogram. Three different levels of physical activity were utilized. These were: (a) cross country runners; (b) individuals participating in regular endurance training a minimum of three days a week; (c) individuals not partaking in any regular physical activity. Fifty-four college-aged men volunteered for the study. An analysis of variance and Duncan's New Multiple Range extended for unequal numbers of replications was used to evaluate between group mean differences. Electro-mechanical lag and heart rate decreased significantly with the increase of physical activity. Mechanical systole, total systole, 1-E, Q-E, Diastole, and W/R ratio increased significantly with increased physical activity. The results of the study indicate that: Increased physical activity results in improved cardiovascular fitness; the level of physical activity influences the duration of selected cardiac-cycle time components; the measurement of cardiac-cycle time phases is useful in evaluating ventricular performance and cardiovascular efficiency.

April 6, 1970
2:30 p.m.

Paul S. Fardy
Department of Physical Education
California State College, Fullerton
Fullerton, California 92631

Symposium on Environmental Quality Education -
Action and Research
Saturday, April 4, 1970
9:00 a.m. to 10:45 a.m.

MODERATOR: Dr. Richard P. Gale, Assistant Professor of Sociology, University of Oregon. President, Eugene Chapter of the Sierra Club.

PAPER 1: "The Challenge of Environmental Education." Dr. J. Alan Wagar, Leader, Forest Service Cooperative Recreation Research Unit and Associate Professor of Forest Resources, University of Washington, Seattle, Washington.

DISCUSSANT: Dr. Donald E. Hawkins, Assistant Executive Secretary for Recreation, Outdoor Education and Research, American Association for Health, Physical Education and Recreation.

PAPER 2: "Challenging the Folklore of Environmental Education with Research." Dr. John C. Hendee, Recreation Research Project Leader, Forest Service, Pacific Northwest Forest and Range Experiment Station, 4507 University Way NE, Seattle, Washington.

DISCUSSANT: Dr. Clay Schoenfeld, Editor, ENVIRONMENTAL EDUCATION, Professor of Journalism and Wildlife Ecology, Coordinator of Conservation Communications Programs, and Director of Summer Sessions, The University of Wisconsin, Madison, Wisconsin.

THE CHALLENGE OF ENVIRONMENTAL EDUCATION. J. Alan Wagar, University of Washington.

In the 20th Century our power to change the environment has rapidly outstripped our ability to predict the consequences of our actions. As a result, many of our technological achievements are causing unexpected and undesired side effects. Such problems as smog, water pollution, and vanishing species are of growing importance as rising numbers of human beings try to find quality living in an environment of fixed size. At the same time, an increasing proportion of these people are growing up in cities where they do not directly experience the interrelatedness of such things as milk, cows, grass, acreage, water, soils, and sunshine. Yet as voters these same people will be called upon to judge the desirability of such schemes as massive transfers of water between regions, a sea-level canal across Central America, weather modification, and farming in the tropics. The potential side effects of such schemes are so enormous that years of study may be needed to determine their safety. Thus the challenge of conservation education is to make every specialist, leader, and voter aware that each effort to manipulate the environment may lead to multiple consequences. Failure to recognize this may mean not only the erosion of environmental quality but ecological disasters that threaten the survival of the human species.

J. Alan Wagar
College of Forest Resources
University of Washington
Seattle, Washington 98105

CHALLENGING THE FOLKLORE OF ENVIRONMENTAL EDUCATION WITH RESEARCH. John C. Hendee, Recreation Research Project Leader U. S. Forest Service - Pacific Northwest Forest and Range Experiment Station.

Environmental education folklore, the traditional but largely unreflective beliefs of environmental missionaries, controls the form and direction of massive environmental-conservation and outdoor education programs. The underlying assumption of such programs is that educational efforts will fall on willing ears and cultivate attitudes encouraging environmental husbandry among all those exposed. However, some evidence suggests that the environmental gospel directed at adults is consumed only by those who already have the religion. Educational efforts directed at students incorporate a number of approaches such as field training, separate environmental science curricula or integration of environmental implications in all subject matter. The underlying premise is that knowledge will change attitudes, values and subsequent adult behavior. Recent developments indicate that cultivating more appreciation for the environmental consequences of society's activity is becoming a national goal. Environmental education programs are growing in size and number as a logical means to that end. However, the strategy is founded more on belief than fact. Rigorous research is needed to identify factors related to the development of environmental awareness so that scarce resources can be devoted to that objective in the most effective manner.

John C. Hendee
U. S. Forest Service
4507 University Way NE
Seattle, Washington

Symposium on Obesity
Saturday, April 4, 1970
10:45 a.m. to 12:15 p.m.

INTRODUCTION: Dr. L. B. Oscai, Department of Preventive Medicine, Washington University School of Medicine, St. Louis, Missouri.

PAPER 1: "Health Hazards Involved with Obesity." Dr. J. S. Skinner, Laboratory for Human Performance Research, Pennsylvania State University, University Park, Pennsylvania.

PAPER 2: "Methods for Measuring Body Composition." Dr. J. H. Wilmore, Department of Physical Education, University of California, Berkeley, California.

PAPER 3: "The Role of Diet in the Management of Obesity." Dr. E. L. Bierman, Chief, Division of Metabolism and Gerontology, Professor of Medicine, University of Washington School of Medicine, Seattle, Washington.

PAPER 4: "The Role of Exercise in the Management of Obesity." Dr. L. B. Oscai, Department of Preventive Medicine, Washington University School of Medicine, St. Louis, Missouri.

MOTOR DEVELOPMENT SYMPOSIUM
Sunday, April 5, 1970
1:30 p.m. to 3:30 p.m.

CHAIRMAN: Lawrence Rarick, University of California, Berkeley

PARTICIPANTS: Helen Eckert, University of California, Berkeley
Jack Keogh, University of California, Los Angeles
Robert Malina, University of Texas

The symposium will be presented in honor of Professor Anna Espenschade, who has made many basic contributions to the area of motor development. Professor Keogh will discuss motor control as a scheme for the study of motor development during the early school years. Professor Malina will discuss factors which might underlie motor development, including growth and parent-size correlates, child rearing practices, and twin relationships. Professor Eckert will make a formal response to the two papers. Professor Espenschade will present comments on some recent observations. Professor Rarick will direct a panel discussion and will accept questions from the audience.

RESEARCH METHODS AND LABORATORY EQUIPMENT SYMPOSIUM
Sunday, April 5, 1970
4:30 p.m. to 6:00 p.m.

PRESIDING: William P. Morgan, University of California, Santa Barbara

SPEAKERS: E. Dean Ryan, University of California, Davis, "Psychosocial Instrumentation" (20 min.)
A. H. Ismail, Purdue University, "Bias Effects in Research" (20 min.)
Franklin M. Henry, University of California, Berkeley, "Individual Differences and Errors in Measurement" (20 min.)

REACTORS: Walter Kroll, University of Massachusetts (5 min.)
Lawrence F. Locke, University of New Mexico (5 min.)
Richard A. Schmidt, University of Maryland (5 min.)

AUDIENCE: Questions from the floor (10 - 15 min.)

RECORDER: John A. Roberts, University of Missouri, Columbia

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